The **REVIEW**

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THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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Steel Cartridge Case Program Explained By Lt. Col. Turner

Reported by E. W. Husemann
Metallurgist, Copperweld Steel Co.

Warren Chapter—Much erroneous information which has appeared in the newspapers in recent weeks concerning the steel cartridge case program was corrected at the regular monthly meeting on Jan. 10 by Lt. Col. H. R. Turner, chief of the Engineering Sub-Office of the Ammunition Branch of the Office of the Chief of Ordnance, Cincinnati, Ohio.

The steel cartridge case program was undertaken in a desperate effort to provide a satisfactory substitute for brass, which constituted a serious shortage in 1941. Changing conditions of war and more accurate knowledge of ammunition requirements have diminshed the demand for items made from brass, and this metal is again available for fabrication into cartridge cases. Furthermore, a given line of equipment can make more brass cartridge cases per day than steel, and these are the main reasons for the conversion back to the manufacture of brass cartridge cases.

Colonel Turner touched on the chemical analysis of the steel used, finish of the sheets or plates, and the manifold problems of production. Although the original drawing operations were similar to those used in the production of brass cartridge cases, it was found that additional operations were necessary with inter-operational anneals and final heat treatment in order to produce casings of the required physical properties. Many new ideas were developed which will be released to the industry as a whole at the end of the war.

Colonel Turner stated that the number of steel cartridge cases made has run into many millions, and the results obtained are excellent. If again we are faced with a serious shortage of brass we will know how to make steel cartridge cases that are completely adequate for the job. Colonel Turner complimented the steel manufacturers and fabricators for their splendid cooperation and insight into the problems they faced in producing shell casings.

Following Col. Turner's talk a two-reel sound film produced by the United States War Department entitled "Substitution and Conversion" was shown. The diversified problems of substitution and the subsequent saving of critical materials by the various departments of the United States Army were vividly illustrated.

What's NEW in THE REVIEW

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round. (See subscription form, Page 7, for additional copies.)

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—Save it for reference.

Something New Added! Review Increases Service

TWO NEW departments make their bow with this issue of the THE REVIEW. A new format and improved method of printing inaugurates in the March issue a change in policy to provide an increased service to A.S.M. members.

The two new departments are devoted to "New Products in Review" and "Manufacturers' Catalogs in Review" and will be found beginning on pages 12 and 13. These features are in addition to the "Review of Current Metal Literature" inaugurated last month—a complete and up-to-date monthly annotated survey of 107 American and foreign technical and business publications.

With these three new departments, as well as the news of important A.S.M. chapter meetings and activities, THE REVIEW will henceforth constitute a complete survey and digest of what's new in technical and business magazines, books, equipment, parts, materials, manufacturers' catalogs, and technical meetings.

Printing by letter-press rather than by newspaper methods on a rotary press, will make it possible to clip and file items of lasting value and importance to A.S.M. members in all fields of metal manufacture, fabrication or use.

Further information on any of the items contained in these departments and the Literature Survey can be easily secured by using the Reader Service Coupon on page 3.

A.S.M. Members Participate In Engineers' War Conference

Reported by H. P. Henderson
Prod. Engr., New Departure Div., G. M. C.

An Engineer's War Conference, sponsored by the War Production and Engineering Council for Northern Connecticut, was held in Hartford on Feb. 16, with many technical societies represented.

Two A.S.M. members of the Hartford Chapter, D. Nemser of the International Nickel Co. and W. E. Bancroft of the Pratt & Whitney Div., N.B.P. Co., both members of the War Production Advisory Committee, did notable work in assembling some fine displays. These covered powder metallurgy, precision casting, all types of critical tool salvage, electroplating, corrosion prevention to meet government specifications, surface coatings, malleable iron castings, shot blasting to improve fatigue strength, magnesium spinning and other metallurgical subjects.

Mr. Nemser spoke at one of the afternoon panel meetings which was presided over by Frank P. Gilligan, also an A.S.M. member.

A.S.M. Nominating Committee Selected

In accordance with the Constitution of the American Society for Metals, President Marcus A. Grossmann has selected a nominating committee from the list of candidates submitted by the Chapters. The personnel of the committee is as follows:

A. O. Schaefer, The Midvale Co. (Philadelphia Chapter); Chairman.

Joseph A. de Bondy, Manitoba Steel Foundries, Ltd. (Manitoba Chapter).

J. B. Johnson, Army Air Forces, Wright Field (Dayton Chapter).

A. B. Kinzel, Electro Metallurgical Co. (New York Chapter).

W. D. McMillan, International Harvester Co., McCormick Works (Chicago Chapter).

W. J. Reagan, Copperweld Steel Co (Warren Chapter).

G. C. Riegel, Caterpillar Tractor Co. (Peoria Chapter).

This committee will meet during the third full week in the month of May, and shall name one candidate for each of the following offices:

President	1 year
Vice-President	1 year
Secretary	2 years
Two trustees for	2 years each

The committee will welcome suggestions for candidates in accordance with the Constitution, Article IX, Section 1 (b), which provides that endorsements of a local executive committee shall be confined to members of its local chapter, but individuals of a chapter may suggest to the nominating committee any candidates they would like to have in office. Endorsements should be sent in writing to the chairman or other members of the committee.

Dix Presents Tulsa Charter And Gives Talk at Inaugural Meeting

Reported by T. C. Tweedie
Chief Metallurgist, Douglas Aircraft Corp.

Tulsa Chapter—The inaugural meeting was held on Jan. 31 in the Ivory Room of the Mayo Hotel, with Edgar H. Dix, Jr., assistant director of research and chief metallurgist, Aluminum Co. of America, as the speaker of the evening.

Mr. Dix, acting for the national officers of the A.S.M., presented the charter to the officers and Executive Committee of the Chapter. The charter is being appropriately framed, and will be hung in the Engineers Club of Tulsa.

Mr. Dix's address concerned "New Developments in High Strength Aluminum Alloy Products" and brought forth some interesting discussion from both the aviation industry and the oil fraternity.

Cleveland Celebrates Silver Anniversary

National Secretary W. H. Eisenman Cuts the Birthday Cake That Featured the 25th Anniversary of the Founding of the Cleveland Chapter. Checking the Eisenman technique are (left) Vice-President Kent R. Van Horn and President Marcus A. Grossmann.

Reported by Seward A. Covert
The Ohio Crankshaft Co.

Cleveland Chapter's 25th Anniversary was celebrated Monday evening, Feb. 7, when more than 450 metallurgists of Northern Ohio gathered for the occasion.

Addressed by National President Marcus A. Grossmann, director of research for the Carnegie-Illinois Steel Corp., Chicago, the meeting featured the 29 charter members of the Cleveland Chapter of whom 16 were in attendance. A large birthday cake was cut by National Secretary Wm. H. Eisenman, who also spoke on the early days of the A.S.M.

"A great contribution to industry has been made by the American Society for Metals. It has been the means of correlating information and establishing standards that in the early days were unknown. The current contributions of the various War Production Advisory Committees of the Society's Chapters have been outstanding and done much to help the war effort," said Mr. Eisenman.

J. V. Emmons, Cleveland Twist Drill Co., who has

(*Continued on page 16*)

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-16. Ore Concentration and Milling. T. B. Counselman. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 57-60.
Wider use of sink and float processes—important new installations and research for iron ore treatment.

1-17. Reduction of Ferro-Alloy Ores. Gilbert E. Seil. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 76-77.
Much current technologic progress but details held for postwar release.

1-18. Metallurgy of Copper. Joseph Newton. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 69-70.
Maximum capacity utilized with no major changes in smelting or refining practice.

1-19. Melting and Pouring Magnesium. M. E. Brooks. *Foundry*, v. 72, no. 2, Feb. '44, pp. 124, 193-194.
Melting equipment, and modern practice in melting, fluxing and pouring magnesium in sand.

1-20. Making Electric Furnace Steel. Victor E. Zang. *Steel*, v. 114, Feb. 21, '44, pp. 88, 110.
Larger percentages of alloy steel scrap used in electric furnaces as a means of relieving the pressure on carbon steel scrap.

1-21. Aluminum Manufacture in the Pacific Northwest. *Western Metals*, v. 2, Feb. '44, pp. 17-18.
Production in the U. S. Six plants represent $116,000,000 investment.

1-22. Some Aspects of Sintering Iron Ores. R. Hay and J. McLeod. *Iron & Steel*, v. 17, no. 5, Jan. '44, pp. 214-217.
An investigation of composition and procedure.

1-23. Production of Magnesium by the Carbothermic Process. T. A. Dungan. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1671, 7 pages.
Direct reduction, Permanente plant, magnesia reduction by carbon, sublimation.

1-24. Changes and Improvements in Modern Copper Smelting. R. A. Wagstaff. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1669, 9 pages.
Milling, roasting, changes in smelting operations, direct smelting, charging, deep-bath smelting, life and operation of plants, metallurgical control, waste-heat boilers, tuyere linings, and balance.

1-25. Special Addition Agent Steels Are Our Safeguard. R. B. Schenck. *Blast Furnace and Steel Plant*, v. 32, Feb. '44, pp. 239-240.
Improvement of steels of the future and safeguarding threat of shortage of Ni, Cr, Mo, etc.

1-26. Recent Developments in Magnesium Production. H. R. Leech. *Magnesium Review and Abstracts*, v. 3, Oct. '43, pp. 120-124.
Pre-war development; American development; Basic Magnesium, Inc., sea-water processes, Permanente Plant; Pidgeon process; British Dominions.

1-27. Cold-Blast Irons Duplicated by Synthetic Mixtures. J. E. Hurst. *Iron Age*, v. 153, no. 7, Feb. 17, '44, pp. 74-76.
Differences between the characteristics and properties of cold-blast pig irons and other types of pig irons have been observed and experimentally investigated. Results in part answer the question propounded by Sweetser in "What is the 'It' in Charcoal Pig Iron" (*Iron Age*, July 1, '43).

1-28. Flexibility Is Basic Characteristic of Aluminum Industries Operations. Joseph Geschelin. *Automotive and Aviation Industries*, v. 90, Feb. 1, '44, pp. 20-23, 58, 62, 64.
Production output of Aluminum Industries, Inc.

2. PROPERTIES OF METALS

2-10. Hydrogen and Nitrogen as Causes of Gassiness in Ferrous Castings. Carl A. Zapffe and Clarence E. Sims. *American Foundrymen's Association Transactions*, v. 51, no. 3, March '44, pp. 517-562.
Gassiness in iron and steel is often a function of the hydrogen content and the changes in solubility of hydrogen in metal which take place during solidification. Hydrogen is introduced into the liquid metal by means of carriers, the most common of which is moisture. Bubbles of hydrogen can form only when nucleating centers are present. These are generally supplied by hydrogen-oxygen or other reactions. Austenitic steel is less subject to gassiness and bleeding than ferritic steel. The addition of deoxidizers serves to replace some of the hydrogen which would otherwise act as a deoxidizer, thus tending to increase the concentration of hydrogen gas in the metal. In exceptional cases, gassiness and bleeding may result from the release of nitrogen by unstable nitrides present in the metals. This occurrence may be prevented by the addition of stabilizing elements such as titanium.

2-11. Indium—the Metal Vitamin. *Western Metals*, v. 2, Feb. '44, pp. 15-16.
History of development and properties of indium.

2-12. Effect of Grain Size and Bar Diameter on Creep Rate of Copper at 200° C. E. R. Parker and C. F. Riisnes. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1690, 8 pages.
Creep tests were conducted on an oxygen-free high-conductivity copper at 200° C. to determine the effect of grain size on creep rate. Grain sizes ranging from 3 to 1500 grains per. sq. mm. were tested in bars of 0.160, 0.375, and 0.505-in. diameter. The number of grains in the cross section of the test bars varied a thousand-fold. The creep strength was found to be independent of grain size for each bar size. The two larger sizes had equal strength, but the small bars were considerably weaker, particularly at high stresses. The small bars seemed to be oxidized considerably, and their high ratio of surface to volume suggested that oxidation was weakening the bars. 16 ref.

3. PROPERTIES OF ALLOYS

3-27. Cartridge Brass—Effects of Chemical Composition. L. E. Gibbs. *Metal Progress*, v. 45, no. 2, Feb. '44, pp. 265-269.
Desirability of adequate scrap segregation and guarding it from careless contamination. Effects of Al, Sb, As, Bi, Cr, Fe, Pb, Ni, P, and Sn. 7 ref.

3-28. Rolled Zinc-Titanium Alloys. E. A. Anderson and P. W. Ramsey. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1687, 9 pages.
Preparation of zinc-titanium alloys. Hot-rolling tests, effect of rolling temperature and conditions on properties, annealing, creep tests and stability of properties on aging of above alloy. 5 ref.

3-29. Constitution of the System Indium-Zinc. F. N. Rhines and A. H. Grobe. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1682, 10 pages.
The liquidus, solidus, and solvus curves of the indium-zinc phase diagram have been located. This is a simple eutectiferous system with the eutectic at 2.8% Zn and 143.5° C. The limits of solid solubility lie at 1.2% Zn in indium, and approximately 0.2% In in zinc at the eutectic temperature, and diminish with falling temperature. Suitable metallographic techniques are described. In compression tests it is found that the true stress sigma corresponding to a standard strain passes through a small maximum at 3.48% Zn, but its value is exceeded in alloys containing 50% and more of zinc. 4 ref.

3-30. Grain Growth and Recrystallization of 70-30 Cartridge Brass. R. S. French. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1673, 16 pages.
Effects of prior cold work and temperature and time of anneal upon the recrystallization and grain growth of 70-30 cartridge brass. 14 ref.

3-31. Effects of Wartime Developments on Future Steels. *Steel*, v. 114, Feb. 14, '44, pp. 104-108, 136, 138, 140, 142, 145-155.
Wartime developments pertaining to steels along the following lines: Fatigue endurance, heat treatment, castings, welding, alloy evaluation, hardenability, special addition agents, NE steels. 34 references.

3-32. Development of High Yield Strength in Clad 24S Aluminum Alloy. Earl R. Weiher. *Iron Age*, v. 153, no. 7, Feb. 17, '44, pp. 64-68.
Four 24S clad aluminum alloy tempers are here discussed, with a description of a precipitation aging process that is sound from a production standpoint. Data on the increase in physical properties of the four tempers are included.

3-33. The Metallurgy of Modern Alloys. R. H. Harrington. *Steel Processing*, v. 30, Feb. '44, pp. 101-105.
The role of strain in precipitation reactions in alloys.

3-34. Aging and the Yield Point in Deep Drawing Steel Sheets. J. R. Low and M. Gensamer. *Steel Processing*, v. 30, Feb. '44, pp. 92-95, 100.
Treating sheet steel in wet hydrogen at a low temperature results in a deep-drawing steel with a very low yield strength, normal tensile strength, fine grain size, and ductility. Experiments described.

3-35. Effects of Wartime Developments on Future Steels. W. P. Eddy. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 22 pp. (Mimeo).
Wartime developments pertaining to steel: discussion of fatigue endurances; heat treatment; castings; welding; alloy evaluation; hardenability; special addition agents; NE Steels. 34 ref.

4. STRUCTURE

4-4. The Structure of Ingot Iron Containing Lead. L. Northcott and D. McLean. *Engineering*, v. 157, no. 4069, Jan. 7, '44, pp. 18-20.
Microstructure; machinability; X-ray examination.

4-5. Recrystallization and Twin Relationships in Silicon Ferrite. C. G. Dunn. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1691, 15 pages.
It has been shown that recrystallization of plastically deformed silicon ferrite can produce complex groups of grains or particles twin-related through more than one order or generation of twins. Twins in the form of small grains or particles within a large recrystallized grain do not have stable boundaries at high temperatures. The large grain in such a group usually absorbs the small particles. In other cases twin boundaries are changed by growth of one grain at the expense of the other. 16 ref.

5. POWDER METALLURGY

Process and Product

5-3. Powder Metallurgy. Frances H. Clark. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 81, 95.
Several applications in ordnance—but little experimentation in untested fields.

5-4. Magnesium Powder Fabrication. *Light Metal Age*, v. 2, Jan. '44, pp. 10-13.
Fabrication steps; the "hammer-mill" process; chipping.

6. CORROSION

6-4. Turbine Blade Deposits. Frederick G. Straub. *Iron & Steel*, v. 17, no. 5, Jan. '44, pp. 224-225.
Their occurrence, modes of formation and treatment.

6-5. Stress-Corrosion Cracking of 70-30 Brass by Amines. H. Rosenthal and A. L. Jamieson. *Metals Technology*, v. 11, no. 2, Feb. '44, Tech. Pub. 1660. 9 pages.
In the presence of moist air, amines can cause season cracking of stressed brass. Under the conditions of these tests the primary amines are more active in causing cracking than the secondary or tertiary amines. 6 ref.

6-6. Galvanic Corrosion. R. H. Brown. American Society for Testing Materials *Bulletin*, no. 126, Jan. '44, pp. 21-26.
Potential differences; effects of polarization and resistance; types of control; current distribution; alleviation of galvanic corrosion. 24 ref.

6-7. Mechanism of Corrosion Processes. R. M. Burns. American Society for Testing Materials *Bulletin*, no. 126, Jan. '44, pp. 17-20.
Electrochemical nature of corrosion; formation of protective films; influence of electrode polarization; application of polarization curves. 6 ref.

7. PROTECTION

7-13. Anodic Films on German Aluminum Alloys. *Iron Age*, v. 153, no. 6, Feb. 10, '44, p. 58.
Samples of anodically treated Al alloy parts from German aircraft examined. Scratch and bend tests showed the films were adherent. Results of chemical tests given.

7-14. Light Alloys: Anodizing Aluminum Castings. *Light Metal Age*, v. 2, Jan. '44, pp. 23, 26, 29.
Anodizing of aluminum-silicon alloys in the die-cast state.

7-15. Electrostatic Fields. G. W. Birdsall. *Steel*, v. 114, no. 6, Feb. 7, '44, pp. 128-129, 168-169.
Aids metal finishing by producing more uniform coat in spraying and dipping operations and by cutting loss from overspray.

7-16. Plastic Dipping for Export Shipment. Harry Forsberg. *Iron Age*, v. 153, no. 5, Feb. 3, '44, pp. 54-55.
All types of machine parts may be dipped in ethylcellulose plastic, which affords complete protection to the point of delivery. The coating is transparent and may be stripped off with complete ease.

7-17. Metallizing Practice. G. C. Close. *Western Metals*, v. 2, Feb. '44, pp. 7-12.
Applications of metallizing; metallizable elements; use as protective coating; use on non-metallic materials; simplicity; surface preparation methods; distance of gun; thickness of coatings.

7-18. Magnesium-Base Alloys: Practical Value of Protective Treatments. C. J. Bushrod. *Magnesium Review and Abstracts*, v. 3, Oct. '43, pp. 114-119.
Corrosion of magnesium-base alloys by salt solutions; atmospheric corrosion of magnesium-base alloys; protective schemes. 14 ref.

7-19. Skinning the Dry-Type Spray Booth. Robert Holder. *Products Finishing*, v. 8, Feb. '44, pp. 20-28.
Advantages and disadvantages of various methods of cleaning dry-type spray booths are presented; author indorses the special spray booth coatings recommended by the manufacturers of spray booths and supplies. Several coatings are named and discussed.

7-20. Some Practical Facts About the By-Products Formed in Different Fields of Hot-Dip Galvanizing. Wallace G. Imhoff. *Wire & Wire Products*, v. 19, no. 2, Feb. '44, pp. 115-117.
Percentage total by-products made in each field of galvanizing.

7-21. Metal Plating of Plastics. *Canadian Metals & Metallurgical Industries*, v. 7, Feb. '44, pp. 33-34.
Methods and applications.

8. ELECTROPLATING

8-12. New Electroplating Lines Apply Tin or Zinc. *Steel*, v. 114, no. 6, Feb. 7, '44, pp. 154-156.
The zinc plating process is essentially the same as the electrotinning process, eliminating only one operation, the reflow treatment which produces the shiny, mirror-like surface seen on tin containers. Although tin plate is produced at Weirton at a speed exceeding 1000 ft. per min., the zinc coating process is slower because heavier coatings are required on zinc-coated products.

8-13. Zinc for Tin. Business Week, no. 754, Feb. 12, '44, p. 50.
Coated sheets produced successfully on an electrolytic line designed for tin. Range of postwar uses explored.

8-14. Corrosion and Its Prevention in the Plating Room. Alfred Baechlin, Jr. *Metal Finishing*, v. 42, Feb. '44, pp. 74-76.
Discussion and full details of the three general types of floor drainage systems in use today in plating rooms, namely: individual drains or sumps, trench drains, and pitched floor.

8-15. A New Electrolyte for Use in Electrotinning Lines. *Blast Furnace and Steel Plant*, v. 32, Feb. '44, pp. 232-234.
Ribbon of steel swirls through a maze of machinery and chemical baths at 1000 ft. a minute, emerging with a shining coat of bright tin in a new, continuous electroplating process that is aiding the tin plate industry by producing material for cans many times faster than older methods permitted. It is estimated that the yearly savings of tin resulting from the use of the electrolytic processes would total 1,200,000 lb. Known as the Halogen Tin Process and developed by the Electroplating Division of E. I. du Pont de Nemours & Co.

8-16. The Fundamentals of Chemistry for Electroplaters. Samuel Glasstone. American Electroplaters' Society *Monthly Review*, v. 31, no. 2, Feb. '44, pp. 121-124.
Definition of molecule, molecules of elements, molecular weights, Avogadro's law, molecular weights and densities of gases.

8-17. Electrotinning Steel Strip at Weirton Steel. *Metal Finishing*, v. 42, Feb. '44, pp. 77-79.
At normal operating speed, it takes the electrotinning installation at Weirton Steel Co. only 8 sec. to plate both sides of a specific section of steel strip. The process of electrotinning at this plant is explained, giving full details and technical data.

8-18. The Chemistry of Electroplating—Part 5. C. B. F. Young. *Products Finishing*, v. 8, Feb. '44, pp. 36-42.
Acids, bases, and salts are discussed, and under this heading are the important normal and molar solutions. Calculations involving inverse proportions are illustrated, and molecular weights and their uses; subject matter on sulphur and some sulphur compounds, and methods for making sulphuric acid are treated.

8-19. Ventilation of Electroplating Departments. Carlyle Artran. American Electroplaters' Society *Monthly Review*, v. 31, no. 2, Feb. '44, pp. 143-147.
Discussion of hoods, fume and dust ventilating systems, and centrifugal fans.

8-20. Porous Chromium for Engine Cylinders. H. Van der Horst. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 7 pp. (mimeo).
Summary of porous Cr plating cylinders to reduce

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A.S.M. Review of Current Metal Literature — *Continued*

cylinder piston ring, and piston ring groove wear. Porous Cr on Al, surface finish and wettability; inspection; sulphide printing porous Cr surfaces.

8-21. **Some Physical and Wear Characteristics of Porous Chromium Plated Rings.** Tracy C. Jarrett. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 5 pp. (mimeo).
Cylinder wear is greatly reduced by use of porous Cr plated ring in top groove. The Cr plated ring shows little wear under abnormal dust conditions; in fact, the apparent life of these rings is unusually good.

8-22. **Summary of Technique of Chrome Plating of Cylinder Barrels.** B. A. Yates. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 5 pp. (mimeo).
Various methods discussed. Preparation of the barrel, bond adherence, bath conditions.

9. ELECTROMETALLURGY

10. ANALYSIS

10-7. **Spot Test for Non-Ferrous Alloys.** *Metal Progress,* v. 45, no. 2, p. 296.
Method for identifying iron, lead and nickel in nonferrous bearings and castings by macro-etching or printing.

10-8. **A Method for the Determination of Alumina in Anodic Baths and Other Solutions Containing Hexavalent Chromium.** Winslow H. Hartford. *Metal Finishing,* v. 42, Feb. '44, pp. 72-73.
A method has been developed for determination of alumina in the presence of chromic acid, and is suitable for the analysis of anodic baths. When substantial quantities of alumina are present, an accuracy of 1% may be expected, but with small quantities of alumina, the method is less accurate. Moderate quantities of copper and trivalent chromium do not interfere, but iron is harmful. 9 ref.

11. LABORATORY APPARATUS, INSTRUMENTS

11-14. **Polishing Soft Steel (Cartridge Cases).** Robert F. Nelson. *Metal Progress,* v. 45, no. 2, p. 297.
Method which avoids pitting when polishing for metallographic examination.

11-15. **The Electron Tube — Genie, Gremlin or Jeep?** W. D. Cockrell. *Blast Furnace and Steel Plant,* v. 32, Feb. '44, pp. 235-238, 240. Also *Industry and Welding,* v. 17, Feb. '44, pp. 56, 58.
Definition of electron tubes; types of tubes; how the tubes work.

11-16. **Corrective Feed Water Treatment.** W. D. Vint. *Iron & Steel,* v. 17, no. 5, Jan. '44, pp. 211-213.
Automatic control by means of pH instruments.

11-17. **The Ten-Thousandth Feeler-Gauge System.** H. H. *Machinery (London),* v. 64, Jan. 6, '44, pp. 9-10.
Devision of a system of gaging and tool setting with the aid of feeler gages by the firm of Nuttall Engineering, Sydney, Australia.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-32. **To Distinguish Stainless From Inconel.** *Metal Progress,* v. 45, no. 2, p. 297.
Simple method using oxy-acetylene torch.

12-33. **Improving X-ray Radiographs by Filtering Out Secondary Radiation.** Robert Taylor. *Metal Progress,* v. 45, no. 2, Feb. '44, pp. 270-273.
Determination of secondary radiation and a method to minimize its detrimental effects. Clarity and contrast of film achieved.

12-34. **Consumer Control of Quality by Inspection.** *Metal Progress,* v. 45, no. 2, Feb. '44, pp. 282-284.
A series of talks held at the national convention of A.S.M. in Chicago. "Considerations having most to do with the Inspector" by Arthur W. F. Green. "Personal Equation in Inspection" by John W. W. Sullivan. "Acceptance Control—Not How Much Inspection, But How Good" by L. E. Ekholm. "Considerations Having to do With the Method of Inspection," by John A. Harrington. "Control Charts," by C. S. Gotwals. "A Specific Application of Quality Control" by H. R. Bellinson.

12-35. **An Engineering Approach to the Selection, Evaluation and Specifications of Metallic Material.** H. W. Gillett. *Steel,* v. 114, no. 6, Feb. 7, '44, pp. 144-152, 171-175.
Suggests abandonment of traditional specification methods and selection of material by engineering judgment based on test data. Process often given "black eye" unnecessarily. Processing by alternate methods; low transverse ductility common; casting offers real advantages; specifications; buyers' intentions beclouded; "virgin metal" proviso stupid; unasked questions held clues.

12-36. **Analysis Shows How to Control and Prevent Locked-Up Stresses.** John Tutin. *Steel,* v. 114, no. 6, Feb. 7, '44, pp. 136-138, 170.
Definition and principles.

12-37. **Determining Endurance Limits of Flexurally-Stressed Steel Members.** Frederick Frantz. *Product Engineering,* v. 15, no. 2, Feb. '44, pp. 97-98.
A method of evaluating the safety of flexurally stressed, heat treated steel members against the type of failure which originates below the surface from repeated stresses in excess of the endurance limit.

12-38. **Magnetic Powder Inspection of Highly Stressed Welds, Castings and Forgings.** J. A. J. Long., *Welding Journal,* v. 23, Feb. '44, pp. 123-124.
Methods for using magnetic powder inspection inexpensive.

12-39. **Inspection Efficiency.** *Machinery (London),* v. 64, Jan. 13, '44, pp. 42-43.
Steps taken to improve inspection efficiency by a firm engaged on the mass-production of small metal components made on automatic machines, capstan lathes, presses and special-purpose machines.

12-40. **Predicting Tractor Bearing Life.** John Borland. *Automotive & Aviation Industries,* v. 90, no. 3, Feb. 1, '44, pp. 36-37, 52, 54.
Procedure for determination of bearing life subjected to constant load at constant speed.

12-41. **Microradiography — A new Metallurgical Tool.** S. E. Maddigan and B. R. Zimmerman. *Metals Technology,* v. 11, no. 2, Feb. '44, Tech. Pub. 1683, 26 pages.
Outline of experimental procedure and discussion of results on tin, iron, lead, tellurium in copper alloys; identification of unknown constituents. 5 ref.

12-42. **How Brittle Lacquer Strain Analysis Aids Design.** M. Hetenyi and W. E. Young. *Machine Design,* v. 16, no. 2, Feb. '44, pp. 147-151, 268.
Stress concentrations at the surface of machine parts are responsible for most structural failures, hence the measurement of surface strain in loaded parts furnishes valuable clues to the weak spots. Use of brittle coatings for this purpose is discussed and some noteworthy applications of the method in design are described and illustrated.

12-43. **Wire Tests and Specifications.** Geoffrey K. Rylands. *Wire & Wire Products,* v. 19, no. 2, Feb. '44, pp. 109-113, 126, 128-129.
Elongation of fracture, torsion test, wrapping, and snarling test.

12-44. **Requirements to Be Met to Obtain Light Drive Fits.** Charles C. Colvin. *Automotive and Aviation Industries,* v. 90, Feb. 1, '44, pp. 24-25, 90.
Steel and duralumin bolt testing.

12-45. **Tightening Is Vital Factor in Bolt Endurance.** J. O. Almen. *Machine Design,* v. 16, no. 2, Feb. '44, pp. 158-162.
Endurance increases as stress range decreases; stress fluctuations unavoidable; effect of elasticity; springs can help or hinder; practical elastic considerations; yield point may be exceeded; bending loads; and utilizing spring members.

12-46. **Latest Findings on Surface Fatigue.** Earle Buckingham. *Machine Designs,* v. 16, no. 2, Feb. '44, pp. 166-170, 248-250.
Surface fatigue is a phenomenon largely responsible for the type of wear commonly known as pitting. Definite information will permit the more intelligent and effective choice of materials for specific service conditions. Plastic flow work-hardens surface; influence of elastic deformation; destructive pitting; tests on cast iron alloys.

12-47. **A Method for Testing Cutting Oils.** H. L. Moir, J. S. Yule, D. J. Wangelin, and R. J. Moyer. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 6 pp. (mimeo).
Tool life tests can be used to determine value of the cutting oil for roughing cuts; finish life is not proportional to tool life for different cutting oils; finish life is the criterion for tool regrinding on finishing operations; oil produces smoother chip flow than dry cutting.

12-48. **On the Strength of Highly Stressed, Dynamically Loaded Bolts and Studs.** J. O. Almen. Preprint. War Engineering Annual Meeing, S.A.E., Detroit, Jan. '44, 11 pp. (mimeo).
Strength of dynamically loaded, highly stressed bolts and studs is determined by the man with the wrench; elasticity of bolts and studs should be as great as possible; bolted members should be as rigid as possible; their loss of dimension is hazardous to strength of short bolts and studs.

12-49. **Quality Control of Engineering Materials.** R. H. McCarroll and J. L. McCloud. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 8 pp. (mimeo).
Outline of the methods of quality control of materials during manufacture and processing used by Ford Motor Co. and illustrated by different types of production and fabrication.

12-50. **Getting a Better Grip on Quality Control.** John Gaillard. Preprint, War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 8 pp. (mimeo).
Control chart methods.

12-51. **Selective Inspection of Bearings.** *Tool & Die Journal,* v. 9, Feb. '44, p. 110.
Description of a method developed for inspection of bearings, which has given the most accurate and satisfactory results.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-3. **Thermostatic Expansion Valves for Low Temperature Applications.** F. Y. Carter. *Refrigerating Engineering,* v. 47, Feb. '44, pp. 96-98.
With the rapidly increasing use of lower temperature in refrigeration, no problem is more important than controls for low temperature work. Here the author describes various types of systems.

13-4. **Technique for Determining Temperatures in the Interior of a Freezing Ingot.** *Industrial Heating,* v. 11, Feb. '44, pp. 252, 254.
Method for accurately measuring temperature conditions within a freezing ingot.

14. FOUNDRY PRACTICE AND APPLIANCES

14-39. **Design of a Front Slagging Cupola Spout.** R. D. Petcher. *American Foundrymen's Association Transactions,* v. 51, no. 3, March '44, pp. 706-708.
Details of a front slagging spout; both the molten metal and slag are carried together through the cupola breast or tap-hole into a trough. The metal then flows under a slag dam, while the slag floats on the metal and runs off at the side of the spout into a slag ladle. The clean metal then flows over the lip of the spout into a receiver from which it is distributed, by means of conventional transfer ladles, to the molding floors.

14-40. **Factors in the Production of Quality Castings.** William G. Reichert. *Foundry,* v. 72, no. 2, Feb. '44, pp. 115, 199-202.
Basic principles for obtaining properly designed castings and effect of pattern upon quality.

14-41. **Tests of Pattern Coating Substitutes for Shellac.** Frank C. Cech. *American Foundrymen's Association Transactions,* v. 51, no. 3, March, '44, pp. 732-736.
The findings of the paper were based on a national survey of shellac and varnish manufacturers, pattern supply houses, pattern manufacturers and foundries. The survey revealed that: 1. Varnish manufacturers had given but little thought to special pattern coatings. 2. Pattern supply houses found pattern manufacturers relatively unwilling to try new coatings. 3. Pattern manufacturers were content to use the traditional coating—shellac.

14-42. **Structure Control of Gray Cast Iron.** R. G. McElwee and Tom E. Barlow. *Foundry,* v. 72, no. 2, Feb. '44, pp. 112-114, 177, 178.
The difference between alloying and inoculation, basic function of inoculation, undesirable gray iron structure, and effect of cooling rate.

14-43. **Precision Castings.** L. L. Wyman and D. Basch. *Foundry,* v. 72, no. 2, Feb. '44, pp. 116-117, 203-206.
Application of precision casting, utilizing either centrifugal or pressure methods, to the production of precision parts made from heat and corrision resistant alloys. Method, directional solidification, materials.

(Continued on page 5)

The REVIEW

The Monthly Survey and Digest of What's New in Metals

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Ray T. Bayless..*Editor*
M. R. Hyslop..*Managing Editor*

Cleveland, Ohio—March, 1944
Volume XVII Number 3

A.S.M. Provides Grants For Corrosion Research

Plans have now been completed whereby the American Society for Metals will provide an annual fund of $1000 for the support of fundamental researches in the field of corrosion. The American Coordinating Committee on Corrosion has been designated to receive applications for grants from this fund.

The Coordinating Committee has named a Subcommittee on Research under the chairmanship of R. M. Burns, assistant chemical director of the Bell Telephone Laboratories, 463 West Street, New York, N. Y. Other members of Dr. Burns' committee are T. S. Fuller of the General Electric Co., F. W. Adams of the Pittsburgh Plate Glass Co., and H. L. Maxwell of the E. I. du Pont de Nemours Experiment Station.

It shall be the duty of this committee to select such research projects as appear worthy of support, to approve the qualifications of applicants for grants-in-aid from the research fund, and to certify to the American Society for Metals the names of successful applicants. The grants-in-aid will vary from $250 to $1000.

Qualified investigators desiring to receive grants from this fund are advised to address a formal application in quintuplicate direct to Dr. Burns. The application should recite the applicant's educational background, experience, and present affiliations, and set forth briefly but clearly the proposed research for which the grant is requested.

Successful candidates must agree to communicate the results of researches supported by this fund to the Secretary of the American Coordinating Committee on Corrosion, 4400 Fifth Ave., Pittsburgh. The Coordinating Committee shall first offer these results to the American Society for Metals for formal publication. With the approval of this Society, the results may then be offered to any of the technical societies comprising the coordinating committee.

Woodside is Cincinnati's 25th Anniversary Speaker

Reported by Kurt Siems
Cincinnati Milling Machine Co.

Cincinnati Chapter—The 25th Anniversary Meeting on Feb. 10 was honored appropriately by the presence of one of the founders and past presidents of the American Society for Metals, W. P. Woodside, chairman of the Board, Park Chemical Co., Detroit, and main speaker of the evening. He had selected, also very appropriately for the occasion, reminiscences from the metallurgical field as experienced in his own life and as recorded by history.

Another feature of this celebration was the presentation of gold service pins by M. D. Strauchen, general superintendent of the Cincinnati Milling Machine Co., and a past chairman of the Rochester Chapter, to ten Cincinnati past chairmen, who had held office between 1919 and 1937, when this custom was adopted.

Regrettably, Messrs. J. C. Hartzell (1922-1925), A. J. Lucas (1927-1928) and E. W. Esslinger (1933-1934) could be remembered only in spirit for the fine work they did to promote the progress of the Chapter. Among the ten past chairmen to be honored were the first chairman of the Chapter (1919-1921), W. A. Spear, now chief engineer and vice-president of the Victor Electric Products Inc., and Lt. Col. G. M. Enos, U.S. Army, formerly just "Doc Enos", professor of metallurgy, University of Cincinnati. The latter spoke briefly in his own inimitable way so familiar to Cincinnati Chapter audiences.

Many of the Chapter's sustaining member companies were represented, making this gathering a true cross-section of the industries interested in the A.S.M.'s efforts and progress.

Officiate at Silver Celebration

Founder Member W. P. Woodside (Left) Reminisced on Metallurgy at Cincinnati Chapter's Anniversary Meeting. Seated beside him is Chapter Chairman A. J. Smith, with Past Chairman G. M. Enos in the background.

Post-War Competition Discussed by Hunter, Panel of Experts

Reported by Harold J. Read
Mellon Institute of Industrial Research

Pittsburgh Chapter—The January meeting was one of many attractions:

It was Sustaining Members' Night for 22 local companies.

It was the occasion of a stimulating address by Dr. Matthew A. Hunter, head of the Department of Metallurgical Engineering, Rensselaer Polytechnic Institute, on "Post-war Competition Amongst Metals".

There was on hand a panel of experts in several fields of metal production to discuss Dr. Hunter's remarks and add their own views.

And finally Chairman Al Bates, recently returned from a trip to South America, gave a most interesting coffee talk including some first hand impressions of our neighboring continent and its people.

At the outset of his talk, Dr. Hunter pointed out that of the 86 million tons of metal produced in this country during the past year, 80 million tons were ferrous metals. From this it is evident that early competition among metals will affect the steel industry only slightly.

The output of light metals is truly small compared to steel, but fairly large compared to other common non-ferrous metals. However, the latter are not likely to be displaced since their present uses are generally predicated upon special properties which are particularly suited to certain conditions or applications.

As far as plastics are concerned, the present situation need cause steel producers but little alarm since the present output of 400,000 tons a year of plastics is insignificant compared to steel production.

Post-war competition will be greatly affected by the way in which three important problems are handled; namely, the cancellation of war contracts, disposal of plants and surplus stock by the government, and conversion of equipment to peacetime manufacturing. The first is an executive problem which was not discussed by the speaker.

Disposal of government-owned war plants and surplus stock may follow one of several schemes. They may be put into a permanent stockpile, and liquidated at a rate proportional to current production or dumped at once for the benefit of the consumers. Dr. Hunter was of the opinion that the proportional liquidation method in one form or another will probably prevail.

He stated that about 90% of the manufacturers would return to making their pre-war products, and that about 40% of present research is pointed toward post-war developments.

Summarizing, he said, "After the war we may expect steel to lose little ground, war machinery will be gradually converted to peacetime production, and government regulations and restrictions, which will be more stringent than those before the war, will be markedly less than those in effect during the war."

The able panel of discussors included Harold K. Work, manager of research and development of Jones and Laughlin Steel Corp.; R. T. Wood, chief metallurgist of the American Magnesium Corp.; Francis C. Frary, director of research of the Aluminum Co. of America; R. A. Miller, technical sales engineer of the Pittsburgh Plate Glass Co.; and F. N. Rhines of Carnegie Institute of Technology.

These men presented the post-war picture of the metal and plastics industries in a most interesting and informative manner, and received a warm hand of applause for their contribution to the meeting.

Is Forging Quality Over-Rated? "No" Says Dixon

Reported by R. Wayne Parcel
Metallurgist, Denver & Rio Grande Western R.R. Co.

Rocky Mountain Chapter—The opinion that forging yields the highest obtainable metal quality has been strongly held from prehistoric times to the present by wielders of swords, sickles and slide rules. Is the present persistence of this idea among engineers justifiable on a sound basis of fact or must it be charged to the very human tendency to depend on past experience, possibly after obsolescence of the latter?

This question was asked and affirmatively answered by E. O. Dixon, chief metallurgical and mechanical engineer of Ladish Drop Forge Co., Milwaukee, at the meeting on Jan. 21. His subject was "Forging and Its Effect on Metal Properties".

Forging generally results in higher ductility and impact for the same ultimate and yield. These changes in physical properties were discussed in connection with heavy forgings, open dies, and closed dies. The conclusion reached was that the greatest enhancement of physical properties is obtained in closed dies.

Mr. Dixon resolved the question of whether or not a given piece should be forged into three considerations: Ease of fabrication, properties obtained, and final cost.

The speaker followed an ingot through the entire forging process to the finished product, explaining the reasons for each step and giving alternative methods for reaching the same results. He illustrated each step with a slide.

Of particular interest were the various tests used to determine the quality of the original steel and of the final product. On a new problem, the same tests are sometimes applied to intermediate stages of a trial forging.

In most drop forge work, the preliminary steps are most important, and are dependent largely upon the operator's judgment. A great deal of skill is also required in the manufacture and care of forging dies, and in the maintenance of equipment.

During the question period it was brought out that the NE steels can be used for 95 to 98% of alloy steel forgings ordered.

The coffee talk was given by Walter Roberts, physicist of the Harvard Observatory at Climax, Colo. Dr. Roberts imparted what information could be revealed on the operation and use of the coronagraph at the Observatory.

High Hp., Low Safety Factors Require Elaborate Tests on Aircraft Forgings

Reported by E. W. Husemann
Metallurgist, Copperweld Steel Co.

Warren Chapter—Discussing "Production and Heat Treatment of Aircraft Forgings" on Dec. 9, A. J. Pepin, metallurgist for the Wyman-Gordon Co., Worcester, Mass., developed the reasons for the elaborate testing necessary for aircraft forgings. This, he said, is based primarily on the high delivered horsepower combined with low safety factors.

This critical examination and testing is applied to crankshafts, propeller shafts, master rods, gears, cylinder barrels, cams, counterweights, propeller blades, hubs, spiders and other parts.

Following Mr. Pepin's talk, two films were shown concerning the forging and heat treatment of aircraft parts in the Wyman-Gordon plant and a teardown and overhaul on an engine and a propeller assembly.

Metal Literature Review—*Continued*

FOUNDRY PRACTICE

(*Continued from page 3*)

14-44. Selecting, Evaluating and Specifying Metallic Materials. H. W. Gillett. *Foundry*, v. 72, no. 2, Feb. '44, pp. 118-119, 207-214.
Abstract from a report "An Engineering approach to the selection, evaluation and specification of metallic materials." Pertinent data relating to castings.

14-45. Saginaw Malleable Makes Steel Castings. Edwin Bremer. *Foundry*, v. 72, no. 2, Feb. '44, pp. 120-121, 191-192.
Sand handling, heat treatment and cleaning.

14-46. Duplexing in Malleable Iron Production. Donald J. Reese. *Foundry*, v. 72, no. 2, Feb. '44, pp. 122-123, 173-176.
Discussion of chemistry of the cupola charge. Importance of the time element in tapping is emphasized, and the significance of different variables in cupola operation.

14-47. Sand Control Reduces Casting Rejects. D. W. Gunther. *Foundry*, v. 72, no. 2, Feb. '44, pp. 150, 152.
Factors to be considered about a base sand are: Grain size, shape and distribution, clay content, and refractory value. Results with various classes of bonding clays given.

14-48. Tests Graphite Rods in Producing Cast Steel. Frank J. Vosburgh and Howard L. Larson. *Foundry*, v. 72, no. 2, Feb. '44, pp. 128-129, 187-188.
The relation of rod size to riser size, and the advantages of the method.

14-49. Use of Cement in Foundry Molding. C. A. Sleicher. *American Foundrymen's Association Transactions*, v. 51, no. 3, March '44, pp. 737-747.
Principles and reactions in the use of cement in foundry molding are explained. Reasons are given for the value of cement in molding, some of which are lower material costs, savings in labor, fuel and power, higher casting quality. The problems involved in the use of cement including the proper mixture, method of mixing and drying time for cement molds, and stressing the importance of the mold blacking operation.

14-50. Stress Relief and the Steel Casting. E. A. Rominski and H. F. Taylor. *American Foundrymen's Association Transactions*, v. 51, no. 3, March '44 pp. 709-731.
Locked-up internal stresses resulting from the method of manufacture and/or heat treatment may affect the service life and dimensional stability of structures. The problem undertaken at the Naval Research Laboratory is in two parts: (1) A determination of rates of relief of stress as a function of temperature, and (2) a stress analysis of castings under various conditions of cooling. This paper describes a special method for determining relaxation rates of steel or other metals. The stress relieving time under prescribed conditions can be readily computed with sufficient accuracy from two or more observations upon each kind of steel at each of two or more temperatures.

14-51. A Study of "Burnt-On" or Adhering Sand. J. B. Caine. *American Foundrymen's Association Transactions*, v. 51, no. 3, March '44, pp. 647-705.
"Burnt-on" sand is the result of metal penetration of large voids in the sand, followed by freezing of the metal, which mechanically locks the sand to the casting. In a highly refractory sand, voids may be present on ramming as the result of large grain size. In less refractory sands, voids may be formed by the fusing of the colloidal matter and finer silica particles present in the sand. Metal will penetrate either type of void provided the sand temperature is higher than the melting point of the casting alloy. Metal penetration may also be reduced or prevented either by the formation of a continuous, extremely viscous fused film such as results when hot metal strikes a properly applied silica wash, or by gas pressure such as results when metal heats an organic binder.

14-52. How to Change the Properties of Sand—II. N. J. Dunbeck. *American Foundryman*, v. 6, Feb. '44, pp. 8-12.
Selection and correct use of sand to achieve the desired casting results. "Effect of other additions" on core mixes.

14-53. Core Blowing as a Factor in a Semi-Production Foundry. Z. Madacey. *American Foundrymen's Association Transactions*, v. 51, no. 3, March '44, pp. 593-616.
Methods of core blowing and related factors at Caterpillar Tractor Co., citing as some of the factors necessary for successful core blowing, accurate sand control, skilled help and cooperation between every department in the organization involved in core blowing. Core blowing equipment and various large and small cores, giving illustrations of same. Procedure and results of experiments conducted on the production of aluminum aircraft cylinder heads.

14-54. Making Cores for the Steel Casting. S. W. Brinson and J. A. Duma. *American Foundrymen's Association Transactions*, v. 51, no. 3, March '44, pp. 563-592.
Description of the methods of making cores for steel castings as practiced at Norfolk Navy Yard. The importance of proper arbors or reinforcing rods for supporting cores, the use of chaplets and the proper material for producing the best cores. Coke or cinder-filled cores vs. hollow cores, including illustrations of these and other cores, as well as of arbors, arbor beds, stamping boards for arbors, etc.

14-55. Precision Castings of Turbosupercharger Buckets. Albert W. Merrick. *Iron Age*, v. 153, no. 6, Feb. 10, '44, pp. 52-58.
War's demand has created a commercial application for a technique heretofore used only in dental and surgical appliances. Small buckets for G. E. aircraft turbosupercharger are being made out of a non-ferrous alloy "Vitallium" that is difficult to machine and forge. History of the development of the investment casting technique for this metal, the various steps in the process of making precision castings from wax patterns.

14-56. The Future of Magnesium Castings. D. Basch. *American Foundryman*, v. 6, Feb. '44, pp. 4-7.
Growth and usage of magnesium castings.

14-57. Aluminum Castings. Robert E. Wick. *Light Metal Age*, v. 2, Jan. '44, pp. 18-21, 34.
Reviews methods and recommended practice in the steps from designing to finishing aluminum castings. Sand and permanent mold castings are discussed.

14-58. Foundry Pig Irons and Refined Irons. E. Morgan. *Iron & Steel*, v. 17, no. 5, Jan. '44, pp. 220-223.
Utilization of high phosphorus qualities.

14-59. Elements of Control in the Grey Iron Foundry. Brian Russell. *Foundry Trade Journal*, v. 72, no. 1429, Jan. 6, '44, pp. 3-8, 2.
Engineering properties of cast irons and their improvement through foundry control.

14-60. Die Casting of Fuse Bodies. H. E. Shepard. *Iron Age*, v. 153, no. 7, Feb. 17, '44, pp. 52-59.
By substituting zinc alloy die castings for brass fuse bodies formerly produced on screw machines, manufacturing costs are reduced and amount of scrap generated minimized. Procedure from die casting to machining and final packaging of the fuses for 20-mm. projectiles is outlined in detail.

14-61. The Use of Basic-lined Ladles in the Desulphurisation of Cast Iron by Sodium Carbonate. N. L. Evans. *Foundry Trade Journal*, v. 72, no. 1430, Jan. 13, '44, pp. 25-30, 39.
Report of laboratory and works experiments with different lining materials.

14-62. Notes on Oil-Sand Practice in the Ordinary Foundry. Wm. Y. Buchanan. *Foundry Trade Journal*, v. 72, no. 1429, Jan. 6, '44, pp. 9-12.
Oil-sand plant, mixing, tests on mixers, design of mixers.

14-63. Notes on Oil-Sand Practice in the Ordinary Foundry. Wm. Y. Buchanan. *Foundry Trade Journal*, v. 72, no. 1430, Jan. 13, '44, pp. 35-37.
Useful hints are given on the drying, storage, and handling of cores.

14-64. Ingenious Designing. *Die Casting*, v. 2, Feb. '44, pp. 30-31.
Designing dies to produce castings at minimum cost. Side openings without side cores or slides.

14-65. Alloys for Die Casting—Part II. *Die Casting*, v. 2, Feb. '44, pp. 32-34.
Advantages of Al for die casting. Limitations and alloy selection.

14-66. Why Die Casting? *Die Casting*, v. 2, Feb. '44, pp. 40-42.
Advantages of die castings from the stand-point of variations in wall thickness; shapes and sizes. Appearance and physical property characteristics of die castings with direct comparisons to other fabricating methods.

14-67. A System for the Impregnating and Polymerizing of Magnesium Alloy Castings. Industrial Heating, v. 11, Feb. '44, pp. 220, 222.
Production of magnesium alloy metal in the form of castings.

14-68. Continuous Casting. T. W. Lippert. *Iron Age*, v. 153, Feb. 24, '44, pp. 48-65, 138, 140, 142, 146, 148.
Hazelett, Merle, Inco, Soro, Pluramelt, Alcoa, Junghans-Rossi, Bethlehem, Eldred-Lindner, Republic and Goss processes.

14-69. Heavy Castings in Green Sand. H. Abnett. *Foundry Trade Journal*, v. 71, Dec. 30, '43, pp. 353-354.
Road roller casting, multiple risers, mold finishing, eliminating defects, facing sand and venting.

14-70. Quality of Castings Begins in the Foundry. William G. Reichert. *Foundry Trade Journal*, v. 71, Dec. 30, '43, pp. 347-352.
Every factor in foundry practice determines the final quality of castings and merits the closest consideration and control.

14-71. The Casting of Brass and Gilding Metal Billets. *Metal Industry*, v. 63, Dec. 31, '43, pp. 423-424.
Fundamental principles in the production of Cu-Zn billets and ingots.

15. SECONDARY METALS

15-4. Magnetic Separation of Non-Ferrous Scrap. H. H. Thompson. *Metal Industry*, v. 63, Dec. 31, '43, pp. 418-419.
Types of machines in use: Pulley, drum, chute-type, magnet chute. Removal of iron from sand.

15-5. Secondary Aluminium in War Production. J. J. Bowman. *Metal Industry*, v. 63, Dec. 31, '43, pp. 420-421.
Segregation of plant scrap; peacetime and present-day scrap; use for secondary metal; alloys suited to use of secondary metal.

15-6. Brass Cartridge Scrap. *Chemical Age*, v. 50, Jan. 1, '44, pp. 15-16.
Re-use for cartridges, the "certified ingot" plan.

16. FURNACES AND FUELS

16-19. Reclaiming Sulphur From Coke Oven Gas. *Steel*, v. 114, no. 6, Feb. 7, '44, pp. 143, 179.
Purification of coke oven gas has been started by the Ford Motor Co., Dearborn, Mich., a sulphur plant now in operation extracting approximately 6 tons of 99% pure sulphur daily. More than a year was required for construction of the plant. How equipment operates; contact is prolonged.

16-20. Fuel Economy in the Iron Foundry. Colin Gresty. *Foundry Trade Journal*, v. 72, no. 1430, Jan. 13, '44, pp. 31-33, 34.
Planning is proved to be of major importance in saving fuel.

16-21. The Dimensions and Rating of the Blast Furnace. Owen R. Rice. *Blast Furnace and Steel Plant*, v. 32, Feb. '44, pp. 221-226.
Top diameter; furnace volume.

16-22. Hand-Fired Furnaces. D. J. Bradbury. *Iron & Steel*, v. 17, no. 5, Jan. '44, pp. 238-240.
Common sources of heat loss.

16-23. The History of the Small Steelmaking Converter. E. C. Pigott. *Engineering*, v. 156, Dec. 31, '43, pp. 535.
History of the Tropenas converter.

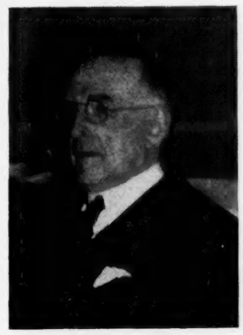
16-24. Electrical Heating Developments in 1943. Guy Bartlett. *Industrial Heating*, v. 11, Feb. '44, pp. 208, 210, 212.
Brief descriptions of new heating units.

16-25. Blast Furnace, Coke Plant and Raw Materials Problems Discussed. *Industrial Heating*, v. 11, Feb. '44, pp. 240, 242, 244, 246.
Gas yield and economy in the coke plant; modern trends in blast furnace design; variations in blowing rates for blast furnaces; and bedding and reclaiming metallurgical raw materials.

(Continued on page 6)

Andreas Hartel Dies Was "Grand Old Man" Of Boston Chapter

ANDREAS HARTEL, JR., a charter member and "Grand Old Man" of the Boston Chapter A.S.M., died suddenly Feb. 4 at his home in West Newton, Mass. He was senior member of the firm of Hartel Brothers & Co., steel merchants of South Boston, and is credited with attendance at more Boston Chapter meetings than any other member.


Andreas Hartel, Jr.

He was born in Holmesburg, Pa. in 1868, and became connected with the steel industry in the early 90's, coming to Boston as district manager of the Park Bros. Steel Co., Ltd. In 1904 he formed the partnership of Mix & Hartel which was succeeded in 1908 by the firm of Hartel Brothers & Co.

Mr. Hartel and his associates have been New England representatives of the Vulcan Crucible Steel Co. of Aliquippa, Pa. for over 40 years, and for several years have been district representatives of the Wallingford Steel Co. of Wallingford, Conn.

Alfred Stansfield

ALFRED STANSFIELD, first chairman of the Montreal Chapter A.S.M. and honorary chairman for many years, died Feb. 5 in his 73rd year.

Dr. Stansfield had been professor of metallurgy at McGill University in Montreal for 35 years, retiring in 1936. He was widely known for his study of electro-metallurgy, his work on electric furnaces giving him world recognition.

Professor Stansfield was born in Bradford, England, studied at the Royal School of Mines and did postgraduate work under the late Sir William Roberts-Austen, whom he honored with a biographical study in the December 1943 issue of *Metal Progress*. Dr. Stansfield began his teaching in the Royal School of Mines and was subsequently awarded a Carnegie Research Fellowship.

He was the first editor of Iron and Steel of Canada and served in many societies and engineering bodies.

William H. Waltz

WILLIAM H. WALTZ, prominent member of the Schenectady Chapter A.S.M., died Jan. 6 after an illness of a year and a half. He had been assistant superintendent of steel, alloy, iron, brass and aluminum and pattern shop plants of the General Electric Co. until his illness.

Mr. Waltz was a civil engineering graduate of Lehigh University and had been employed at Bethlehem Steel Co. as assistant superintendent of foundries, at Crucible Steel Casting Co., Cleveland, as superintendent, and at Newport News Shipbuilding and Drydock Co. as assistant superintendent of foundries.

Alva L. Grinnell

ALVA L. GRINNELL, Detroit Chapter member, senior employee of the sales department of the Rustless Iron and Steel Corp., died Feb. 3. Mr. Grinnell was one of the oldest employees, in point of service, of the Rustless Iron and Steel Corp., and had been Detroit Office district manager. He had been ill for several years.

James A. Nolan

JAMES A. NOLAN, 54, New York state representative of the Carpenter Steel Co., Reading, Pa., died Jan. 17 at Rochester, N. Y. He was associated with the company for 33 years, and had been a member of the Rochester Chapter A.S.M.

Misses First Meeting in Five Years

Washington Chapter Chairman C. E. Jackson of the Naval Research Laboratory missed his first meeting since he became an officer in the Society five years ago, when he found it necessary to be out of the city on a business trip at the time of the January meeting. Secretary-Treasurer J. A. Bennett of the National Bureau of Standards handled the gavel in able fashion.

Almost 150 years ago an experimental, all-iron house was built in England. At last advice it was still in use.

Review of Current Metal Literature—*Cont.*

16. FURNACES AND FUELS

(Continued from page 5)

16-26. **Oster Plant Heat Treat Utilizes Lead and Salt Bath Pot Furnaces.** *Industrial Heating,* v. 11, Feb. '44, pp. 214, 216, 218.
Description of lead and salt bath pot furnaces used in manufacturing processes of the Oster Manufacturing Co., Cleveland, Ohio.

16-27. **Advantages and Disadvantages of Electric Furnaces.** Victor Paschkis. *Industrial Heating,* v. 11, Feb. '44, pp. 226, 231-232, 234, 236, 238.
Discussion of considerations which apply concerning all applications of electric furnaces, advantages and disadvantages.

17. REFRACTORIES AND FURNACE MATERIALS

17-9. **Carbon Refractories for Blast Furnaces.** Josef M. Robitschek. *Iron Age,* v. 153, no. 5, Feb. 3, '44, pp. 48-53.
The use of carbon refractories in the blast furnace has thus far been limited to European practice. Although initial cost of installation is high, their long life and the elimination of inner cooling plates among other benefits make carbon linings economical for use in the United States. Advantages of various carbon linings over the conventional firebrick are discussed in detail.

17-10. **Industrial Survey of Refractory Service Conditions in Electric Steel Furnaces.** *Industrial Heating,* v. 11, Feb. '44, pp. 274, 278, 280, 282, 284, 286, 288, 290.
Lengthy discussion of the conditions to which commercial refractories are subjected in acid and basic electric furnaces used in the manufacture of steel.

17-11. **The Syphon Brick Method of Cupola Tapping.** E. R. Dunning. *Foundry Trade Journal,* v. 71, Dec. 30, '43, pp. 341-345.
Use of a syphon brick facilitates metal handling and slagging procedure.

18. HEAT TREATMENT

18-23. **Cycle Annealing.** Metallurgicus. *Metal Progress,* v. 45, no. 2, pp. 295-296.
General discussion of principles and application.

18-24. **Rapid Hardening of Sprockets.** S. Covert. *Metal Progress,* v. 45, no. 2, p. 297.
An automatic fixture for use with induction unit for hardening teeth on drive sprockets for half-trac combat vehicles at a saving of more than half the time formerly used.

18-25. **Heat Treatment of Magnesium Alloys.** C. E. Nelson. *Light Metal Age,* v. 2, Jan. '44, pp. 17, 30, 32, 34.
Solution, aging, and stabilizing heat treatments for magnesium alloys.

18-26. **Isothermal Quench Baths Applied to Commercial Practice.** Harold J. Babcock. *Iron Age,* v. 153, no. 5, Feb. 3, '44, pp. 44-47.
Time-temperature transformation curves can be invaluable aids in improving physical properties of steel products. Information obtainable from equilibrium diagrams and TTT curves compared. Isothermal transformation curves of several carbon and alloy steels are examined.

18-27. **Hole Quenching Stops Breakage of 40-mm. Cartridge Die Rings.** Wilton F. Hoag. *American Machinist,* v. 88, no. 3, Feb. 3, '44, pp. 115-116.
Up to 100,000 impressions made with header die rings quenched in special fixture. Tangential compression offsets loading and unloading reactions of process.

18-28. **Isothermal Quench Bath Applied to Commercial Practice.** Harold J. Babcock. *Iron Age,* v. 153, no. 6, Feb. 10, '44, pp. 62-69.
Description of equipment and treatment used in industrial applications. Importance of the molten salt quench bath is stressed and comparisons with other quenching media. 15 ref.

18-29. **Applying Prepared Atmospheres to Metal Processing.** E. G. de Coriolis. *Mechanical Engineering,* v. 66, Feb. '44, pp. 111-114.
Preparation of atmospheres, functional utility, furnace construction, types of equipment, Bell annealer, operation. 6 ref.

18-30. **Heat Treatment of Medium Carbon Cast Steel in Moderately Heavy Sections.** K. L. Clark, H. F. Bishop, and H. F. Taylor. *American Foundrymen's Association Transactions,* v. 51, no. 3, March, '44, pp. 617-646.
Six 10 x 10 x 20-in. castings and 6 each of 2 types of test coupons were cast of approximately 0.25% carbon steel. These castings and coupons were subjected to various heat treatments designed to shorten the annealing treatment sometimes applied to moderately heavy steel castings of this approximate chemical composition. Savings in heat treating time were achieved by accelerating heating rates, by reducing soaking periods, and by utilizing air cooling and quenching. Physical properties were improved rather than harmed.

18-31. **To Heat Treat in or Out?** A. S. Eves. *American Machinist,* v. 88, no. 4, Feb. 17, '44, pp. 97-98.
Can you afford to do a first class heat treating job in your plant, or should the work be sent to an expert commercial shop? Fill out these forms and check the costs against outside quotations.

18-32. **Applying Prepared Atmospheres to Metal Processsing.** E. G. de Coriolis. *Mechanical Engineering,* v. 66, no. 2, Feb. '44, pp. 111-114.
Preparation of atmospheres; atmosphere-furnace construction; operation of bell annealer. 6 ref.

18-33. **Heat Treating "Moly" High Speed Steel.** Francis A. Spencer. *Tool Engineer,* v. 13, Feb. '44, p. 85.
Heat-treating procedure.

18-34. **The Treatment of Materials by the Deep-Freeze Process.** E. Gregory. *Machinery (London),* v. 64, Jan. 13, '44, pp. 32-33.
Applications of the Deep-Freeze process. Heat treatment, stabilization of precision tools, apparatus.

18-35. **Progress in the Heat Treatment of Cast Iron.** J. S. Vanick. *Iron & Steel,* v. 17, no. 5, Jan. '44, pp. 235-238.
Tests and results of treating cast iron. 10 ref.

(Continued on page 7)

Two Chapters Hear About Magnaflux

Zyglo Process Detailed at Montreal: Based on Oil Penetration

Reported by J. Royer
Engineer, Welding & Supplies Co.

Montreal Chapter—C. E. Betz, vice-president of the Magnaflux Corp., guest speaker at the Feb. 7th meeting, reviewed briefly the "Zyglo" process of inspection, a recent development of the Magnaflux Corp. which permits detecting surface cracks in both metallic and non-metallic products. The process is based on the fact that thin oil will penetrate into the minutest cracks, and will come out of the crack to a certain extent after the surface has been wiped clean.

The operation consists in immersing the parts in a special penetrating oil, to which has been added a fluorescent substance. Immersion lasts from 15 min. to 24 hr., depending on the minuteness of the cracks likely to be present. The parts are then washed with running water, and dried in a hot air dryer, or by wiping. Within 5 min. to a few hours the oil comes out of the cracks; this may be hastened by the addition of a special powder.

Finally, the parts are examined, preferably in semi-darkness, under a lamp emitting rays very close to the ultra-violet. Under this lamp, any fluorescent material present in the cracks will appear as bright greenish lines. Depth of cracks may be gaged to a certain extent by the quantity of oil that has come out.

Fields of application include aluminum and magnesium castings, certain plastics, stainless steel welds, and carbide tools. The process differs from Magnaflux in that it indicates surface cracks only.

Turning to Magnaflux inspection, Mr. Betz illustrated this method with a short film prepared by Chicago University.

If a magnetic field be induced in a part, any defect which lies at right angles to the field will cause a concentration of the field at the extremes of the defect. If the defect is close enough to the surface, the lines of force may come out of the surface; in all such regions, small magnetic particles will be attracted, and the defect will accordingly be indicated. Surface cracks, internal cracks, and non-metallic stringers can thus be detected. Magnetic fields may be induced longitudinally or circularly in the part, so as to show up defects lying in different directions.

The process can be "continuous" (powder applied while the magnetizing current is on) or "residual" (powder applied only after the part has been magnetized). Also the process can be "wet" (magnetic particles suspended in liquid which is poured over the part) or it can be "dry." Energizing current may be d.c. or a.c.; it may be steady or of the surge type.

According to Mr. Betz, for the intelligent application of Magnaflux, each part to be tested should first be considered carefully as to what defects are really objectionable, and then the particular method should be specified that will indicate these defects alone, if possible. For instance, when a bolt is used in tension, longitudinal non-metallic stringers or cracks, unless large, do not warrant rejection, whereas transverse surface cracks at the bottom of threads or under the head, as caused by quenching, are really objectionable and must be detected. Hence the proper Magnaflux inspection of such bolts would be "residual" with a longitudinal field. A circular field, or the "continuous d.c." method would not be the most desirable in this case.

Magnaflux Needs Experienced Operator, Los Angeles Learns

Reported by Fred Robbins
Technical Director—Plomb Tool Co.

Los Angeles Chapter—Figuratively speaking, the Magnaflux method of inspection, in the hand of the inexperienced operator, is a gun in the enemy's closet. This was the comment of Chairman Joe Burgard at the conclusion of the January meeting.

Carl E. Betz, vice-president and technical director of the Magnaflux Corp., principal speaker for the evening, was introduced by "Luke" Spalding, technical chairman. That the subject of Magnaflux testing is a truly controversial one was apparent from the very lively discussion and questions that follow Mr. Betz's talk.

As if to accept a challenge, the speaker recited that due to the abnormal growth of magnetic testing in the early part of this war, and the demand for Magnaflux inspection of aircraft parts, misconceptions of the scope and methods have led to condemnation of Magnafluxing by manufacturers who have adopted the method under protest.

Carrying his audience through both theory and practice of magnetic testing by the powder method, Mr. Betz explained the best procedures in both wet and dry methods of testing with either alternating or direct current. Surface and sub-surface seams, grinding checks, quenching cracks and incipient fatigue cracks can be detected by characteristic patterns produced by the "leakage flux."

The parts are first magnetized and then coated with finely ground iron powder or magnetic oxide by sprinkling or by wetting in a solution containing the powder. If the powder material is made fluorescent and the pieces viewed in black (nearly ultra-violet) light, the method is known as Magnaglo testing.

Although the wet-continuous method is used largely in the aircraft industry, according to Mr. Betz, no single method of testing is satisfactory over a wide range of application. In the hands of the metallurgist or the engineer, some particular procedure may be devised and used successfully.

Magnetic testing can be adapted to certain tests which will supply information concerning conditions within the metal. It then is up to the inspector to interpret the indications produced based on the knowledge built on previous tests and experience.

Sub-Zero Transformation Benefits High Speed Steel

Reported by H. N. Logsdon
Metallographer, Reynolds Metals Co.

Louisville Chapter—"Practical Heat Treating Using Sub-Zero Transformation" was the subject of an address by G. B. Berlien, chief metallurgist of the Lindberg Steel Treating Co., Chicago. He covered the equipment necessary, application, and the benefits derived from a sub-zero transformation of high speed tool steels after heat treatment.

Mr. Berlien, who spoke at the meeting on Jan. 18 in the Kentucky Hotel, is widely recognized as an authority on the heat treatment of high speed tool steels, as well as the application of heat treating processes in the ferrous and non-ferrous fields.

In conjunction with Mr. Berlien's address the Lindberg Engineering Co. presented the second edition of the film "Heat Treating Hints" in sound and color. The highlights of this film included slow motion, close-up shots of steel being quenched in brine; selective quenching; several methods of providing a protective covering for tungsten and moly steels during heating in a non-atmosphere furnace; and a number of quenching ideas which have resulted in straight, full hardened parts which might be very troublesome quenched in the ordinary way.

All-Plastics Post-War World A Journalist's Dream

Reported by J. D. McNair
Indiana Steel & Wire Co.

Muncie Chapter—Journalists' dreams of an all-plastic post-war world were deprecated by Harry J. McGowan, Jr. of the Bakelite Corp., who addressed the meeting on Jan. 11 on "Plastic Materials and New Fabricating Techniques". Mr. McGowan believes that such overselling will do the plastics industry much more harm than good, and stated that present heavy production figures are still in pounds rather than tons.

A bird's-eye view of the general types of plastics brought down to earth many names which had been only words to most of the metals men present—phenolics, acetates, butyrates, polystyrenes, methacrylates, even nylon. The latter, now known chiefly as stockings and parachutes, will be known soon as a molding material, too.

The conventional molding methods were reviewed, and new methods such as Heatronic and low-pressure were explained. The wide variety of filler materials that can be used, including various farm and barnyard products, was of much interest.

The coffee talk, "The Brazil of Tomorrow", was by R. L. Seabury, of Delco-Remy, Anderson. The future of Brazil was glowingly portrayed, especially in aspects of interest to the world of metals.

Most of our critical materials, with insufficient domestic sources, are either already produced or await only development in Brazil. Large reserves of nickel, molybdenum, manganese, tungsten, tantalum, titanium, beryllium, industrial diamonds, and of course coffee and rubber, might well give Brazil the title "Stockpile of Democracy", complementing the "Arsenal" to the North.

Metal Literature Review—*Continued*

18. HEAT TREATMENT

(Continued from page 6)

18-36. Cold Water Spray Quench. V. S. Sorenson and F. O. Riek. *Iron Age*, v. 153, no. 7, Feb. 17, '44, pp. 60-63.
Quenching method in which a dense fog is used rather than a spray results in corrosion-free material, and eliminates much distortion trouble. Uniformity of quenching, which compares favorably with that of an immersion quench, is obtained.

18-37. Nitriding. L. G. Whybrow Palethorpe. *Chemical Age*, v. 50, Jan. 1, '44, pp. 11-14.
Case-hardening steels with nitrogen.

18-38. Induction Hardening and Brazing. W. S. Craig. *Canadian Metals & Metallurgical Industries*, v. 7, Feb. '44, pp. 22-24.
Principles and applications.

18-39. Hardening and Brazing in Tocco Unit. *Iron Age*, v. 153, Feb. 24, '44, p. 75.
"Three-in-one" heat treating operation made possible by change in design. Effects saving in steel and relieves forging facilities.

18-40. Sal-Way Steel Treating Co. Employs Salt Bath Furnaces Exclusively. *Industrial Heating*, v. 11, Feb. '44, pp. 292, 294, 296.
Description of the Sal-Way Steel Treating Co. processes, which specialize in the heat treatment of tools, dies, and intricate parts for aircraft made of alloy steel.

18-41. Controlled Atmospheres for Heat Treating. C. E. Peck. *Steel Processing*, v. 30, Feb. '44, pp. 111-113.
Method of obtaining various gases and their applications in heat treating operations.

18-42. Heat Treating Beryllium Copper. Wayne Martin. *Iron Age*, v. 153, Feb. 24, '44, pp. 66-71.
Properties of Be-Cu depend to a large extent on its proper heat treatment. Effects of solution anneal and precipitation hardening on physical properties and microstructure of the alloy discussed. Advantage of ternary over binary alloys evaluated.

18-43. Martensite Reactions in Alloy Steels. *Industrial Heating*, v. 11, Feb. '44, pp. 248, 250.
Discussion of the results of the Greninger-Troiano quench-temper procedure.

18-44. Ordnance Flame Hardening. Stephen Smith. *Canadian Metals & Metallurgical Industries*, v. 7, Feb. '44, pp. 24-28.
Applications in U. S. program.

19. WORKING

Rolling; Drawing; Pressing; Forging

19-32. Forging 75-mm. Shell on Converted Rubber Presses. Alan B. Salkeld. *Iron Age*, v. 153, no. 6, Feb. 10, '44, pp. 70-72.
High explosive shells are being produced by the pierce and draw method on rebuilt presses that were originally designed for much slower work in the rubber industry. With the exception of a rotary hearth furnace, all the equipment used by this wire products plant was rescued from the scrap heap.

19-33. The Use of Carbides for Press Work. Athel F. Denham. *The Modern Industrial Press*, v. 5, Jan. '44, pp. 28-30.
Interrupted by the outbreak of the war and suspension of most commercial manufacturing, an important production development holding great promise for post-war use is in the field of application of carbides to the processing of sheet metal and other stamping and press operations.

19-34. Tooling With Plastics. Emric W. Berger. *Iron Age*, v. 153, no. 5, Feb. 3, '44, pp. 62-64.
A new thermoplastic material called Toolite has been found to be especially valuable for making hydropress form blocks because of its high compressive strength. It is also applicable to tool jigs and checking fixtures. Mixing the ingredients is like making cake batter and is done on identical commercial equipment.

19-35. Designing of "Trouble-Free" Dies. C. W. Hinman. *The Modern Industrial Press*, v. 5, Jan. '44, pp. 25-26.
There are many advantages in blanking and forming multiple parts in punch presses. The next nearest approach, in the competition of producing cheap parts, is by casting them from foundry patterns. But even machine cast parts cannot be favorably compared with those made in dies. Cast parts lack the light weight, smooth appearance, and the low cost of die parts.

19-36. Crossroll Forging at Christy Park. Arthur F. Macconochie. *Steel*, v. 114, Feb. 21, '44, pp. 80-82.
Forging weight reduced; redistribution of forging work; production; round slugs; flame cutting and sawing favored; slug diameter; rotary hearth furnaces.

19-37. Drawbenches—Their Operation, Uses and Drives. A. L. Thurman. *Steel*, v. 114, no. 7, Feb. 14, '44 pp. 124-128, 159.
Increasing demand for tubular shapes has brought the drawbench to the forefront. In this, the first of a series of three articles on this cold finishing unit, the author discusses various developments in design which have increased production, and cites effective means for loading mandrel, feeding material on rod and handling finished product.

19-38. Drawbenches—Their Opeartion, Uses and Drives. A. L. Thurman. *Steel*, v. 114, no. 8, Feb. 21, '44, pp. 94-96, 116-122.
Seamless tubes cold finished on drawbenches, the non-ferrous industry's use of tube benches and the newly developed continuous drawbench which finishes two tubes at once though it works four tubes most of the time.

19-39. Small-Scale Sheet Steel Fabrication. George Herrick. *Iron & Steel*, v. 17, no. 5, Jan. '44, pp. 208-210.
On-off methods in the home of quantity production.

19-40. Recent Progress in Cold Drawing of Seamless Steel Tubes. D. W. Rudorff. *Blast Furnace and Steel Plant*, v. 32, Feb. '44, pp. 227-231.
Plasticity and aging; maximum reduction; improvement in strength due to cold working; deformation efficiency; stressing percentage; deformability and resistance to creep. 7 ref.

19-41. Safety in the Use of Metal-Working Drill Presses. *Western Metals*, v. 2, Feb. '44, pp. 26-27.
Compilation from many sources taken from data sheets of National Safety Council, Chicago.

19-42. Forming Aluminum. Jerry Wilford. *Tool Engineer*, v. 13, Feb. '44, pp. 65-67.
Taking advantage of the "set" obtained by adding stretch to the bending of aluminum shapes, the Goodyear Aircraft Corp. has developed a machine for mass production which eliminates springback and handwork. Complete details and other data on aluminum forming progress are given.

19-43. Design of Stampings to Facilitate Production. Ralph A. Wagner. *Machinery*, v. 50, Feb. '44, pp. 171-174.
Detailed data on the design of stampings for quantity production, types of stampings made, materials used, and die design suggestions—fourth and last article.

19-44. Heating Metals for Forging. John Mueller. *Industrial Heating*, v. 11, Feb. '44, pp. 193-194, 196.
Forging furnaces; effect of furnace atmosphere; rate of heating; heating W and Mo steels; forging aluminum.

19-45. Processing Steel Parts in Blanking and Forming Dies. C. W. Hinman. *Steel Processing*, v. 30, Feb. '44, pp. 96-97, 113.
Construction details of the die; operation of the die; bending and forming.

19-46. Hydraulic Presses for Post-War Metal Working Production. *Steel Processing*, v. 30, Feb. '44, pp. 90-91.
Description of sheet metal forming equipment designed and built by The Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

19-47. Forging Die Design. John Mueller. *Steel Processing*, v. 30, Feb. '44, pp. 88-89.
Design of forging dies; production costs; die design with double impressions; group forgings.

19-48. Metal Propeller Blades Precision Rolled on an Automatic Mill. J. W. Smith. *Automotive & Aviation Industries*, v. 90, Feb. 15, '44, pp. 22-24, 170.
The automatic rolling mill is designed so that it will repeat any number of passes with precision registration at a predetermined reduction with the proper metal distribution at each station. Testing of a two-roller system with a roller replacing the longitudinal die disclosed that depth control of the metal in the groove was practically impossible. It was found that the roller and longitudinal die combination will produce any blade shape possible with the two-roller setup and in addition excels in all forms of precision cavity rolling.

19-49. Lubrication in Deep Drawing. Crowther, Liddiard and Marwood. *Iron Age*, v. 153, Feb. 24, '44, pp. 72-75.
Occurrences on die and metal surface in deep drawing and how lubrication is affected under pressures and temperatures encountered in this operation.

19-50. Drawing of Fine Uncoated Steel Wire. R. R. Preston. *Canadian Metals & Metallurgical Industries*, v. 7, Feb. '44, pp. 29-30.
Cleaning, lubrication and dies important.

20. MACHINING AND MACHINE TOOLS

20-40. Heavy Repairs on Steam Locomotives. Fred B. Stauffer. *The Modern Industrial Press*, v. 5, Jan. '44, pp. 32, 34, 40.
Material conservation achieved by the railroads in conjunction with the national campaign to save critical commodities. Part played by machine tools, from small units to the heaviest categories, in accomplishing the other objectives in rail shop practice.

20-41. What Knurling Tool to Use on the Screw Machine. A. Ainsworth. *American Machinist*, v. 88, no. 3, Feb. 3, '44, pp. 88-90.
Each of four types of knurling toolholders for Brown & Sharpe automatics presents a distinct advantage on certain classes of work. Here are suggestions as to best applications for each.

20-42. Tool-Life Tests. O. W. Boston. *Mechanical Engineering*, v. 66, Feb. '44, pp. 130-132.
Proposed standard of tool life tests for evaluating the machinability of single-point tools, cutting fluids, or materials cut.

20-43. Progressive Dies Are Important Tools. C. W. Hinman. *Modern Machine Shop*, v. 16, Feb. '44, pp. 194-200.
A progressive die for plier handles; order of operations.

20-44. Practical Ideas From Practical Men. *American Machinist*, v. 88, no. 3, Feb. 3, '44, pp. 99-104.
Electric light signals keep heavy crane loads level. Improvised set-up for light milling. Rubber mask protects shaft when plating gears. Hand-operated arbor saves machine time. Plastic nameplates formed to cylindrical surfaces. Emery disks break sharp edges on connecting rods. Level squares portable drills. Sliding fixture expedites tapping operations. Cerrobend eliminates denting of aircraft tubing. Single blade on cutter mills radius. Eliminates filing of die-casting molds.

20-45. Utilization Boards Keep Machines Busy. H. M. Atwood. *Modern Machine Shop*, v. 16, Feb. '44, pp. 138-148.
Centralized control system that would provide an accurate, up-to-the-minute picture of just how much each machine in each shop was being used 24 hours per day, along with an indication of the work expectancy for each individual machine.

20-46. Increasing Tool Life by Better Tool Finishing. V. H. Ericson. *Mechanical Engineering*, v. 66, Feb. '44, pp. 107-110.
Tool grinding procedure, finishing operations, sharpening gear cutters, advantages of keener edge and high surface finish.

20-47. Machining Plastics. W. S. Low, Jr. *Iron Age*, v. 153, no. 6, Feb. 10, '44, pp. 59-61, 137.
Cutting speeds for machining plastics are generally higher than for metals. Different results are obtained with various grades of plastics. Some materials can be finished smoothly with a bronze cutting tool. Abrasive fillers sometimes dull the usual high speed steel cutting tools and necessitate a hard cutting tip such as tungsten carbide.

20-48. The Operating Principles of Precision Machine Tools. R. E. Blakey. *Machinery Lloyd*, v. 16, Jan. 8, '44, pp. 37-43.
Design and operation of a precision machine tool is governed mainly by application of basic physical principles, coupled with the logic of mechanical science.

(Continued on page 8)

Review of Current Metal Literature—*Cont.*

20. MACHINING AND MACHINE TOOLS

(*Continued from page 7*)

20-49. **A Fixture for Contour Machining.** Robert Mawson. *Steel,* v. 114, Feb. 21, '44, p. 91.

With this type of machine tool fixture, intricate shapes can be produced at low cost with minimum waste of material. This fixture is designed to make concave and convex shapes.

20-50. **Is Milling Being Revolutionized?** Guy Hubbard. *Steel,* v. 114, Feb. 21, '44, pp. 76-77.

In the light of past history, current events in tool engineering indicate that next move will be up to machine tool builders. Significant developments in metal working.

20-51. **Increasing Tool Life by Better Tool Finishing.** V. H. Ericson. *Mechanical Engineering,* v. 66, no. 2, Feb. '44, pp. 107-110.

Tool grinding procedures; tool finishing; sharpening gear cutters; advantages of keener edge and high surface finish.

20-52. **Bedding-in Lathe Carriages by Power.** *American Machinist,* v. 88, no. 4, Feb. 17, '44, p. 93.

Bedding-in and aligning big engine lathe carriages at the Monarch Machine Tool Co. is now done by a power-driven device which materially reduces manpower required for the job. The operation consists of moving the lathe carriage back and forth the length of the lathe ways, determining the bearing spots and scraping these so that when the job is finished the carriage will run smoothly along the lathe bed and in accurate alignment with the headstock.

20-53. **Practical Ideas From Practical Men.** *American Machinist,* v. 88, no. 4, Feb. 17, '44, pp. 99-104.

Dividing head speeds machining of castle nuts; assembly fixture holds gears in alignment; continuous lubrication for loose pulleys; burrs removed semi-automatically from screws; redesigned gage blocks save steel; painting rack eliminates masking; portable tool speeds locomotive repairs; circular tool removes burrs from cylinders; truck attachments simplify materials handling; bell-cap center punch insures accurate drilling; tool devised for airloc fasteners.

20-54. **Chevrolet Develops Low-Cost Cutters for Finning P. & W. Pistons.** *American Machinist,* v. 88, no. 4, Feb. 17, '44, pp. 83-87.

Cutter blades better able to withstand conditions peculiar to milling cooling fins inside the piston are now being made upon a production line basis. Cutter cost has been reduced 75%.

20-55. **Disintegrator Drilling.** *Steel,* v. 114, no. 8, Feb. 21, '44, p. 92.

Removes broken drills, taps, reamers without damaging work piece.

20-56. **Grinding Steel-Cutting Carbide Tools.** W. L. Kennicott. *Machinery,* v. 50, Feb. '44, pp. 158-161.

Correct methods of grinding carbide tools for cutting steel will greatly prolong the life of the tools and increase cutting efficiency, thereby reducing costs.

20-57. **A Method for Determining Speeds and Feeds for Milling Operations.** S. C. Bliss. *Machinery,* v. 50, Feb. '44, pp. 153-157.

To get the most out of milling machines and cutters, the most effective feeds and speeds must be used. This article describes how these were determined in one war production plant.

20-58. **Automotive Techniques Cut Production Costs.** *Tool Engineer,* v. 13, Feb. '44, pp. 72-80.

Machining: milling, broaching, boring, grinding; special machines; work location; materials handling; forging shell cavities; materials conservation.

20-59. **Multiple Piercing Die for Aircraft Parts.** *Iron Age,* v. 153, no. 7, Feb. 17, '44, pp. 69-73.

In order to coordinate the rivet holes in the assembly of the 10 pieces which make up a catwalk for the Boeing Flying Fortress, a flexible piercing die has been devised which will accommodate itself with minor adjustments to piercing of flats, angles and T-sections. Use of manually operated side guides or stock pushers largely makes this possible.

20-60. **Boeing's "Porcupine."** *Tool Engineer,* v. 13, Feb. '44, pp. 91-92.

Piercing die produces 388 holes simultaneously in Flying Fortress part. In piercing nine other parts, to produce a total of 976 rivet holes, it handles gages ranging from 0.064 to 0.150 in. Hole location accuracy is to 0.0005 in., even where 0.167 in. holes are only 0.5 in. apart on centerline.

20-61. **Attachments that Increase Versatility of High-Production Grinding Machines.** H. E. Balsiger. *Machinery,* v. 50, Feb. '44, pp. 147-152.

The answer to how a wider variety of work is being handled by the application of properly designed attachments to grinding machines.

20-62. **Profile Boring on Multi-Tool Lathe.** S. Smith. *Machinery (London),* v. 64, Jan. 13, '44, p. 41.

Design of device to enable pro-boring operations to be performed on a B.S.A. multi-tool lathe.

20-63. **Grinding Aero-Engine Crankcases.** *Machinery (London),* v. 64, Jan. 6, '44, pp. 11-13.

Construction of the machines for production of steel crankcases.

20-64. **Increase Your Machine Range.** A. E. Rylander. *Tool Engineer,* v. 13, Feb. '44, pp. 68-70.

Besides highlighting universal features of the horizontal boring mill, this article considers possibilities of turning on the milling machine and of mounting a small lathe cross-wise to an open-belt machine. Ideas presented concerning turning a large wheel, cutting a gear when the equipment is under the required range.

20-65. **How to Secure Fine Surfaces by Grinding.** H. J. Wills and H. J. Ingram. *Machinery,* v. 50, Feb. '44, pp. 167-170.

Ninth of a series—discusses the subject of coolants.

20-66. **Toggle Lever Drill Jigs.** C. W. Hinman. *Tool & Die Journal,* v. 9, Feb. '44, pp. 87-92.

Modern designs for drilling jigs and tapping fixtures.

20-67. **High Production Broaching of Drive Spline Inserts.** *Tool & Die Journal,* v. 11, Feb. '44, pp. 107-108.

Method of cutting deep slots in alloy steel drive spline inserts for aircraft hydraulic disc brakes.

(Continued on page 9)

Special Meeting Honors Prof. Stoughton

Reported by R. L. Deily
Bethlehem Steel Co.

Lehigh Valley Chapter in honoring its distinguished colleague, Bradley Stoughton, established a new high in attendance by outstanding metallurgical men. The evening was started by the customary dinner, attended by all but a few of the past local chapter chairmen.

National Secretary Bill Eisenman presented a few stirring remarks as coffee talker, including an excellent description of the activities of the Society, especially in regard to its technical efforts and aid to the country in the present war. After the dinner the technical meeting was chairmanned by Professor Stoughton in whose honor the meeting was held.

The first Annual Bradley Stoughton Award was presented to Bradley Stoughton himself by Prof. Robert Stout of Lehigh University. This award is to be presented annually to the speaker on Bradley Stoughton Night.

Professor Stoughton introduced National President Marcus A. Grossmann as the technical speaker. Before his talk Dr. Grossmann heaped further honor on Professor Stoughton by presenting him with the National President's Medal.

The technical talk on "Hardenability" explained in Dr. Grossmann's simple terms what the effect of each alloying element is and how he determined his now commonly used hardenability criteria. The lengthy discussion by A.S.M. members Stoughton, Fetzer. Gifford, Fry, Luerssen, Green, Epstein, Herty and others indicated the widespread interest the talk aroused.

During the day the members of the Executive Committee were tendered a luncheon by Bill Eisenman after which Bill outlined in detail the present status, both technical and financial, of the National Society and gave the Executive Committee members a chance to discuss pertinent problems in relation to both the national and local chapters.

Bureau of Mines Issues Five Films on Aluminum

Five new Bureau of Mines instructional source films depicting some of the manufacturing processes used in the fabrication of aluminum and aluminum alloys have just been completed and are available for free public distribution, Dr. R. R. Sayers, director of the Bureau, has announced.

The new films constitute a series of "How to Form Aluminum" pictures, but each is complete in itself and is not dependent on the others for continuity. The 16-millimeter sound films, like other Bureau of Mines films, were produced in cooperation with a large industrial concern.

The film subjects are classified as "General Sheet Metal Practices", "Blanking and Piercing", "Tube and Shape Bending", "Drawing, Stretching and Stamping", and "Spinning". The pictures describe and depict by action shots and animation the fundamental techniques of the various operations of fabricating aluminum and aluminum alloys.

Applications for free short-term loans of the films should be addressed to the Bureau of Mines Experiment Station, 4800 Forbes St., Pittsburgh 13, Pa., and should state specifically that the borrower is equipped to show sound films. No charge is made for the use of the films, but the exhibitor is expected to pay transportation charges and for loss or damage other than normal wear.

Warren Celebrates First Anniversary With National Officers' Night

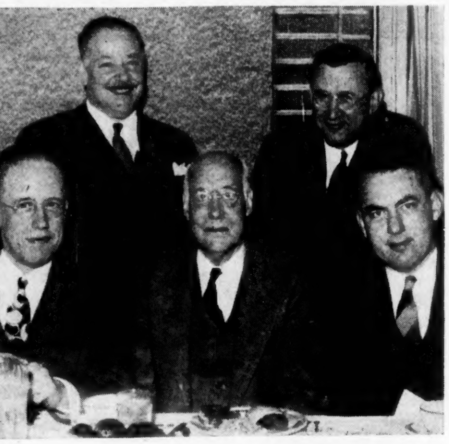
Reported by E. W. Husemann
Metallurgist, Copperweld Steel Co.

Warren Chapter marked the first anniversary of its organization by celebrating National Officers' Night on Feb. 11.

M. A. Grossmann, national president of the Society and director of research of the Carnegie-Illinois Steel Corp., spoke on "Principles of Heat Treatment". This discourse was presented in the logical and concise manner so typical of Dr. Grossmann.

Prior to Dr. Grossmann's talk W. H. Eisenman told the assembly of the status of the Society which now includes 62 chapters and over 18,000 members. This, of course, was accompanied and preceded by Bill's humorous anecdotes concerning the country gentleman.

Approximately 140 members and guests enjoyed the excellent fish and turkey dinner and free smokes. Copperweld Steel Co. was given a vote of thanks for subsidizing the meeting.



National Officers Were Present at Lehigh Valley Chapter's Stoughton Night. Seated are, left to right, National President M. A. Grossmann, Professor Stoughton, and Chapter Chairman W. A. Schlegel. Standing in rear are National Secretary Eisenman and Past President B. F. Shepherd.

Powder Metallurgy Enters Second Era

Reported by Charles Nagler
Instructor in Metallurgy, University of Minnesota

North West Chapter—The "standing room only" sign was again posted at the February meeting, when Prof. Gregory Comstock of Stevens Institute of Technology came to Minneapolis to speak on "Powder Metallurgy."

Professor Comstock traced the history of powder metallurgy from its first use in the 18th Century in the production of platinum down to World War I, when the Germans perfected the first cemented tungsten carbide tools and revolutionized the machining industry as far as cutting speeds and tool life were concerned. After this discovery the demand for carbide tools in the United States was tremendous and a price was fixed for the alloy at $1.00 per gram or $452 per lb.

Powder metallurgy has made it possible to produce porous bearings through which oil can flow by capillarity. The porosity of these bearings is in the range of 40%. The manufacture of porous bearings is not possible by any other means.

Powder metallurgy is now going into its second expansive era in that certain metal parts can be made more cheaply, costly machining operations can be eliminated, and a saving in material can be effected.

Prior to the introduction of friction materials made by powder metallurgy, the common materials were composed of synthetic resins, bonding such materials as silica, asbestos, and graphite. These decomposed at a temperature in the neighborhood of 600° F. Friction materials made by powder metallurgy containing copper, tin, graphite, iron, and lead, can be used up to a temperature of 1200° F., which has greatly extended the life of clutch plates on tractors.

Some of the methods used in producing metal powders—grinding, stamping, atomizing, electroplating, condensation—were discussed by Professor Comstock. The general practice of manufacturing parts by powder metallurgical methods was explained in some detail and some of the difficulties were mentioned.

A series of slides was shown indicating the microstructure of powders used by the industry at the present time. At the close of the talk, the meeting was thrown open for general discussion participated in by the members of the Chapter, their guests, and the speaker.

Wheelco Instrument Assets Purchased

Assets of Wheelco Instruments Co., Chicago, have been purchased by Fred A. Hansen and Cary H. Stevenson, vice-presidents of the Lindberg Engineering Co., Chicago, and several associates. The business of the industrial instruments firm will be continued at the same location under a new corporation, the Wheelco Instruments Co.

Messrs. Hansen and Stevenson, both members of the Chicago Chapter A.S.M., will serve respectively as president and secretary-treasurer of the new company. Richard Schoenfeld and Theodore Cohen, vice-presidents of the old company, will continue in the same capacity. Hansen and Stevenson will continue to be active in the management of Lindberg Engineering Co.

Hardenability Test Should Not Exclude Importance of Analysis

Reported by P. J. Neff

Supervising Metallurgist, Research Laboratory, American Steel Foundries

Calumet Chapter—Some of the recent developments in the use and interpretation of the Jominy hardenability test were discussed by Walter E. Jominy, chief metallurgist, Dodge-Chicago Plant Division, Chrysler Motor Corp., at the Jan. 11th meeting.

The Jominy test started as a simplified means of determining the hardenability of steel without the tedious and expensive testing of many different sized bars. Further development showed a means of predicting the hardness at critical locations of complex shapes such as the roots of gear teeth. The test has now advanced to the stage where many producers are obtaining a Jominy test from every heat of steel.

It was pointed out in this connection that, while in the future hardenability will probably enter into customers' requirements to a greater extent, these requirements should be set up with an eye to practicability. Chemical analysis, while it may become less important, should not be obscured.

Variations in Test Permitted

Discussing the test, Mr. Jominy stated that while the original standards for the test have not changed, variations are permissible without detrimental effect. Small changes in water temperature and height of the water jet produce no noticeable effect. The cupped end may be eliminated since quenching a flat ended specimen does not lead to water running up the side of the specimen.

A closed container with an inch of cast iron chips in the bottom was recommended for heating the specimens because the use of graphite blocks to prevent scaling of the quenched end causes additional heating of that end of the specimen.

Considerable mention was made of the means of locating the proper point on the hardenability curve for practical use. Some methods have used the half hardness method or the point representing 50% martensite. Mr. Jominy prefers the method of determining "practical hardenability" rather than a theoretical value.

A five point drop in hardness from the quenched end is used as a practical value. This corresponds roughly to formation of 5% fine pearlite. For other requirements, different hardness drops corresponding to larger amounts of unhardened products may be suitable.

Among numerous slides, there were some showing the effect of different times and temperatures of soaking on the hardenability. For some steels a minimum time of soaking can be determined below which the hardenability is decreased. Mr. Jominy cautioned that lower hardness must not be confused with lower hardenability. Two steels with identical hardenability may have different hardness because of different carbon contents.

Discussion led to the question of use of different sized specimens. Mr. Jominy stated that any size specimen can be used but that standards must be set up for any new size since the cooling rates obviously differ from the standard specimen.

Subscription Dinner Planned for Stoughton's Retirement From Teaching

A subscription dinner in honor of Dean Bradley Stoughton, a past president of the American Society for Metals, is being planned by his associates at Lehigh University on the occasion of his retirement from active teaching duty as professor of metallurgy. The event, a stag dinner, will take place at the Hotel Bethlehem, Bethlehem, Pa., on Saturday evening, April 15.

Because of Dean Stoughton's host of friends and his prominence in so many fields of activity, it is expected that a large number of people would like to participate in the dinner. For patriotic reasons, however, Dean Stoughton is anxious that his friends from out of town should not be asked to leave their duties to travel on already overcrowded trains. The dinner is therefore planned as a local affair.

It has been suggested that those who do not attend the dinner might write letters of appreciation. Such letters should be addressed to The Secretary, Department of Metallurgical Engineering, Lehigh University, Bethlehem, Pa. They will be bound into a permanent volume which will be presented to Dean Stoughton.

Metal Literature Review—*Continued*

21. CLEANING AND FINISHING

21-16. Brushing Wheels Solve Many Metal-Finishing Problems. R. O. Peterson. *American Machinist*, v. 88, no. 3, Feb. 3, '44, pp. 97-98.
Selection of brushing wheels made after compiling information on: 1. What is to be accomplished? 2. What kind of equipment is available? 3. What are the properties of the material involved, especially hardness? 4. At what rate and under what conditions must the work be done?

21-17. Cleaning Metallic Belt Links. *Steel*, v. 114, Feb. 14, '44, pp. 120-122.
Production setup used by National Stamping Co., Detroit, one of the largest link producers in the field. Latest modern equipment; a smooth yet fast flow of work; clever yet simple devices to relieve or assist purely manual work.

21-18. Metal Cleaning and Solvent Degreasing. Edward Engel. *Metal Finishing*, v. 42, Feb. '44, pp. 80-81.
Presentation of a primary view to serve as a chart when considering the subject of metal cleaning and degreasing. Types of solvent degreasers are discussed together with equipment and procedures of metal cleaning.

21-19. Production of Multi-Colored Effects on Anodized Aluminum. V. F. Henley. *Metal Finishing*, v. 42, Feb. '44, pp. 82-85.
Description of the processes which have proved suitable for the production of multi-colored finishes on anodized aluminum, namely: mottled colors, double anodizing, stopping-off by offset printing, stopping-off by silk screen process, and photographic processes. 22 patents; 2 references.

21-20. Munitions Bring Up Questions, Too. Jeffrey R. Stewart. *Products Finishing*, v. 8, Feb. '44, pp. 30-34.
Flame priming, coating by the electric spray method, fire-retardent paints, film thickness, and painted vs. unpainted aircraft discussed by the author. Questions and answers.

21-21. Infra-Red Paint Drying by Gas. *Machinery (London)*, v. 64, Jan. 6, '44, pp. 14-18.
Experiments which show that gas has an important part to play in the development of high rates of heat transfer by the use of infra-red.

21-22. Oxide Black Finishes on Steel. Jerome Black. *American Electroplaters' Society Monthly Review*, v. 31, no. 2, Feb. '44, pp. 131-140.
Depending on the exact formula used, 7¼ to 8 lb. of salts are required for each gal. final solution for a boiling temperature of 295 to 298° F. The boiling temperature is an exact indication of the amount of salts in the solution. The solutions must always be used at the boiling point to secure uniform results. The boiling point changes due to evaporation of water only and may be corrected if too high by the addition of water. If too low, salts may be added or the solution allowed to boil until the temperature rises to the desired point. Racking of work is sometimes a problem as is the processing of large bulky pieces which may have a tendency to lower the temperature when immersed.

21-23. Industrial Dryers and Drying Systems: I. A. W. Ferre. *Industrial Heating*, v. 11, Feb. '44, pp. 262, 264, 267, 268, 270, 272.
Discussion of the fundamentals of drying by evaporation at atmospheric pressure; presentation of the principles involved; and illustrated descriptions of the typical dryer installations.

21-24. Infra-Red Drying with Gas. *Steel Processing*, v. 30, Feb. '44, pp. 109-110.
Application of heat by infra-red rays in paint drying, baking, preheating and other industrial processing operations.

21-25. Cleaning Metallic Cartride Belt Links After Stamping and Forming. *Steel Processing*, v. 30, Feb. '44, pp. 98-100.
Description of the operation of the shot blast cleaning function in the productive set-up used by National Stamping Co., Detroit.

21-26. Finishing for Utility. C. M. Moore. *Die Casting*, v. 2, Feb. '44, pp. 37-39.
Kinds of finishes and methods of finishing determined by die casting alloy and the purpose of the finished part. Practices at the Link Aviation Devices, Inc.

21-27. Finish-O-Phobia. Paul O. Blackmore. *Die Casting*, v. 2, Feb. '44, pp. 25-28.
Flexibility of finish; methods of application of finish.

22. WELDING, BRAZING, AND FLAME CUTTING

22-62. Rotating Weldment Manipulator Cuts Welding Costs. Harold E. Bailie. *American Machinist*, v. 88, no 3, Feb. 3, '44, pp. 94-96.
An easy-to-make manipulator cuts scavenger header welding costs in two by saving time and labor. The manipulator could be adapted to other odd-shaped weldments usually requiring much time, and labor-wasting positioning during the welding.

22-63. Steel Plate Clad With Cupro-Nickel. Joseph V. Kielb. *Metal Progress*, v. 45, no. 2, Feb. '44, pp. 276-279.
Parts for small, high duty condensers and liquid coolers, and for machinery covers to resist corrosive spray, are made of cupro-nickel sheet, welded to steel plate in hydrogen brazing furnace, using thin Cu film for joining material.

22-64. Weldability of Steel. Martin Seyt. *Metal Progress*, v. 45, no. 2, Feb. '44, pp. 298-304, 316.
Cracks in welds and welded structures; tests for hard areas; controlling ductility and hardness.

22-65. Boron Treated Electrode Coatings Aid Cast Iron Welding. J. A. Neumann. *Iron Age*, v. 153, no. 5, Feb. 3, '44, pp. 56-58.
Boron introduced into the coating of monel welding electrodes appears to behave as a flux, permitting thorough binding between the monel and cast iron, giving an excellent weld.

22-66. "Heliarc" Welding Light Gage Butt Joints. *Light Metal Age*, v. 2, Jan. '44, p. 16.
The use of the "Reverse Bevel" for eliminating microscopic cracks, and other considerations for obtaining good butt welds with light gage magnesium alloys.

22-67. Electric Resistance Brazing. C. Lynn. *Steel*, v. 114, no. 8, Feb. 21, '44, pp. 98-100, 126.
Electrical connections to commutators of motors and generators are detailed. Good joints are made without expensive solders, yet provide stronger and better connections.

22-68. Helium-Shielded Arc Welding of Magnesium Alloys. F. A. Wassell. *Welding Journal*, v. 23, Feb. '44, pp. 148-150, 152.
Power, helium, mechanics, joint preparation, backing plates, strength of butt joints.

22-69. Production of Welded Hulls for Wheeled Tanks. *Machinery (London)*, v. 64, Jan. 6, '44, pp. 1-6.
Description of production of welded hulls for wheeled tanks employed by Guy Motors, Ltd.

22-70. Thermit Welding in Production Work. *Steel*, v. 114, Feb. 14, '44, pp. 102-103, 134.
Process long used for repair work now finding increasing applications as regular production tool in fabrication of heavy assemblies.

22-71. The Silver Soldering of Electrical Connections. J. E. Petermann and E. H. Frederick. *Industry and Welding*, v. 17, Feb. '44, pp. 70-72, 74-75.
Provision for the minimizing of the use of tin in the manufacture of electrical machinery by silver soldering.

22-72. The Welding Engineer—What's His Job? Walter J. Brooking. *Welding Engineer*, v. 29, Feb. '44, pp. 50-51.
The welding engineer's job varies greatly from firm to firm. Still there are certain basic responsibilities which are more or less common to all organizations. First of three-part series on arc welding engineering problems.

22-73. Design of Spot Welded Aluminum Alloy Aircraft Structures (Part I). Albert Epstein and H. O. Klinke. *Aero Digest*, v. 44, Feb. 1, '44, pp. 80-84.
Relation of physical properties of aluminum spot welds to the type of loads and service conditions experienced in aircraft, with particular reference to the primary structure of the airplane. Included is a general review of the factors that have limited the use of spot welding in primary structures in the past.

22-74. Arc Welding Wins Its Spurs. *Tool Engineer*, v. 13, Feb. '44, pp. 81-82.
Development of positioning equipment set the stage for a major production role for the forerunner of the modern welding process.

22-75. Welding in the World of Tomorrow. T. B. Jefferson. *Welding Engineer*, v. 29, Feb. '44, pp. 35-38.
New uses, new users, applications to new materials and the need to continue vocational school training programs are among author's predictions of what postwar future of welding is going to be.

22-76. 50,000 Spots per Day. Jacob Joachimi. *Welding Engineer*, v. 29, Feb. '44, pp. 40-43.
Specialization speeds spot welding at Bell Aircraft Corporation, where welding operators have just one job —to operate their machines. A conveyor for metal cleaning is one of the factors which help to attain as many as 50,625 spots per working day from a single welder.

22-77. Wartime Railroad Welding. Arthur Havens. *Welding Engineer*, v. 29, Feb. '44, pp. 44-47.
Today new parts can be obtained, if at all, only after long delays, but our rolling stock is kept rolling by welders capable of working miracles with their torches.

22-78. Injurious Welding Fumes. Joseph Schuman Wright. *Welding Engineer*, v. 29, Feb. '44, pp. 48-49.
A welding operator discusses welding fumes in non-technical and non-medical language.

22-79. Reinforcing Structures Under Load. W. Spraragen and S. L. Grapnel. *Welding Journal*, v. 23, Feb. '44, pp. 65-s-92-s.
Reinforcement and repair of bridges and other structures, failures and methods of prevention, tests. A review of the literature until Jan. 1, '43. 89 ref.

22-80. Gas Weld and Furnace Weld Tubing for Construction Purposes. A. C. Weber. *Welding Journal*, v. 23, Feb. '44, pp. 113-120.
Manufacture of furnace and gas weld tubing, applications in dams, including Grand Coulee, embedded tubing systems.

22-81. Railroad Repairs Switches by Welding. Arthur Havens. *American Machinist*, v. 88, no. 4, Feb. 17, '44, pp. 91-92.
Because repairs with new parts averaged more than the cost of a new switch, the Rutland now welds worn parts, building them up to their original dimensions.

22-82. Constant Current Ignitron Control for Resistance Welding Machines. B. G. Higgins. *Welding*, v. 12, no. 2, Jan. '44, pp. 47-52, 81.
Power circuit, action of the circuit.

22-83. The Welding of Light Metals. *Welding*, v. 12, no. 2, Jan. '44, pp. 59-65.
Welding Al and Mg and their alloys. Details regarding the preparation of parts to be joined, procedure and equipment required.

22-84. Choice and Preparation of Welding Edges for Metal Arc Welding. E. Fuchs. *Welding*, v. 12, no. 2, Jan. '44, pp. 66-73.
Methods of preparation, common faults and their consequences of V-butt joints with and without backing strip; U-butt joint and single J joint; single bevel joint and fillet welds.

22-85. Refrigeration of Electrodes in Resistance Welding. A. L. Munson. *Welding*, v. 12, no. 2, Jan. '44, pp. 53-58, 65.
New method involving a system of electrode refrigeration which speeds up the assembly of aluminum alloys.

22-86. Wire Bending Attachment on Spot Welder. *Iron Age*, v. 153, no. 7, Feb. 17, '44, p. 73.
Simple bending attachment on a spot welder; designed and produced by the tool design department of the Boeing Aircraft Co., it has resulted in two workers producing as many straps in 1 hr. as six persons did previously in a full day.

22-87. An Important Contribution to the Science of Welding. D. Rosenthal. *Welding Journal*, v. 23, Feb. '44, pp. 92s-96s.
Evaluation of the papers "A Tentative System for Preserving Ductility in Weldments" and "Measurement of Cooling Rates Associated with Arc Welding and Their Application to the Selection of Optimum Welding Conditions." 8 ref.

(Continued on page 10)

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Apr. 17	Engineers Club		
Birmingham Dis.	Mar. 21	Thomas Jefferson Hotel	Ray L. Farabee	X-Ray-Magnaflux Symposium
Boston	Apr. 7	Hotel Sheraton	H. J. Babcock	Salt Bath Hardening
Buffalo	Apr. 13	Hotel Statler	R. E. Ward	Aluminum and Magnesium Castings in the Aircraft Industry
Calumet	Apr. 11	Phil Smidt's Rest., Roby, Ind.	K. W. Brighton	Electrolytic Tin Plate from the Can Maker's Point of View
Canton-Mass.	Apr. 20	Elks Club	E. G. DeCoriolis	Furnaces and Furnace Atmospheres
Chicago	Apr. 13	Chicago Bar Association	J. O. Almen	Effect of Design and Finish on Mechanical Properties
Cleveland	Apr. 3	Cleveland Club	R. P. Koehring	Powder Metallurgy
Dayton	Apr. 12	Engineers Club	Three Local Speakers	Symposium
Detroit	Apr. 10	Horace H. Rackham Bldg.	R. A. Grange	Effect of Boron
Hartford	Apr. 11		V. T. Malcolm	Modern Inspection Methods in the Steel Foundry
Indianapolis	Apr. 17		O. J. Horger	What the Metallurgist Should Know About Design.
Lehigh Valley	Apr. 21	Bethlehem Hotel		Annual Dinner Dance
Mahoning Valley	Apr. 11	Y. M. C. A.	Gilbert Soler	Electric Furnace Steels
Milwaukee	Apr. 18	Athletic Club	L. J. Markwardt	Wood as an Engineering Material
Montreal	Apr. 3	Queen's Hotel	Bennett Chapple	Armco Ingot Iron Practice
New Haven	Apr. 20	Hotel Barnum, Bridgeport, Conn.	Maurice Reswick, H. G. Keshian, Henry E. Robinson	Symposium on Manufacture of Steel Cartridge Cases
New Jersey	Apr. 17	Essex House, Newark	J. B. Johnson	Aircraft Equipment and Materials of Construction
New York	Apr. 10	Bldg. Trade Employers Assoc.	J. C. Mathes	Magnesium
North West	Apr. 5	Coffman Memorial Union, Univ. of Minn.	John A. Harrington	Gages
Notre Dame	Apr. 12	Engineering Audit., Univ. of Notre Dame	Haig Solakian	Salt Baths and Heat Treatment of Metals
Ontario	Mar. 31	Royal Connaught Hotel, Hamilton	K. C. Compton	Protection of Metals from Corrosion
Philadelphia	Apr. 28	Engineers Club	W. A. Schlegel	Heat Treating and Use of High Speed Tool Steel
Pittsburgh	Apr. 13	Roosevelt Hotel	Morris Cohen	Internal Changes During Heat Treatment of High Speed Steel
Rhode Island	Apr. 5		S. L. Hoyt	Toughness of Steel and Relation to Impact Testing
Rochester	Apr. 10	Lower Strong Audit., Univ. of Rochester	W. J. Conley	Welding
Rockford	Apr. 26	Faust Hotel	Mr. Mather	Mechanical and Physical Properties of Austenitic Steels
Rocky Mountain	Apr. 21	Oxford Hotel, Denver	A. A. Bates	Plastics
Saginaw Valley	Apr. 11	Herman Fisher's Hotel, Frankenmuth, Mich.	A. DiGiulio	Copper Brazed Steel and Monel Tubes
St. Louis	Apr. 21	York Hotel	W. E. Jominy	Hardenability
Springfield	Apr. 17	Sheraton Hotel		Induction Hardening
Syracuse	Apr. 4	Onondaga Hotel	Floyd C. Kelley	Tantalum, Its Uses and Properties for Cemented Tantalum Carbide Tools
Texas	Apr. 13	Houston Country Club	W. A. DeRidder	Modern Forging Practice
Toledo	Apr. 24	Hillcrest Hotel		Steel
Tri-City	Apr. 11			Party Night
Washington	Apr. 10	Garden House, Dodge Hotel	W. C. Stewart	
West Michigan	Apr. 17	Rowe Hotel, Grand Rapids	Movies	Modern Plastics Preferred; Steel—Man's Servant
Worcester	Apr. 12	Boys' Trade School	C. K. Worthen	Grinding of Carbide Tipped Tools
York	Apr. 12	Harrisburg, Pa.	Norman Tisdale	Addition of Boron to Cast Iron and Steel

Plastics Uses Grow But Limited Structurally

Reported by L. Geerts
Republic Steel Corp.

Boston Chapter—Iron, aluminum, and magnesium are the only three basic structural materials, A. Allan Bates, manager of chemical and metallurgical research for Westinghouse Electric & Mfg. Co., pointed out in a practical talk on "Engineering Materials of the Future," presented before a large gathering at the Hotel Sheraton on Feb. 4.

It is unlikely that aluminum or magnesium will ever compete with iron from a point of tonnage, Dr. Bates said. Manganese and titanium, while plentiful, have only remote possibilities of becoming basic materials. Other metallic elements are used for more or less specialized applications.

A growing competitor to the metals industry is the apparently unending field of plastics — substances whose sources are literally inexhaustible. Production has risen from under 50 million lb. of synthetic resins during 1930 to 450 million lb. during 1941.

The sources of plastics are many. There are natural plastics, such as pitches and shellac; proteid plastics derived from animal life; cellulosic plastics, substances of vegetable life; and synthetic plastics which have no apparent relation to their reagents.

Plastics are produced as lacquers and enamels, as adhesives for wood and fabrics, and for binding laminated materials. They lend themselves to a wide variety of applications, such as window screening, pipe, handles for tools, helmet liners, goggles, and kitchenware. The transparent nose on a bomber is a wartime application. The "plastic" aircraft fuselage emerges as 95% plywood and 3% resin.

Plastics have been cold worked from a tensile strength of 9000 psi. to 100,000 psi.

While plastics will compete with metals in post-war markets, they are definitely limited for structural applications, being relatively expensive, of low strength, and sensitive to temperature. They promise to complement the metals rather than replace them, thereby creating many new product possibilities.

Paul Ffield, superintendent of development and research branch of the Central Technical Department, Bethlehem Steel Co., Quincy, Mass., as technical chairman, directed the discussion period. Through the courtesy of the Bell Aircraft Corp., "Cannons on Wings", a moving picture in technicolor, was enjoyed by the members and guests.

Good Tool Steels Start In the Furnace, Gill Says

Reported by Paul F. Ulmer
Metallurgist, Link Belt Co.

Indianapolis Chapter—An exceptionally well-prepared paper on "Recent Developments in the Field of Tool Steels" formed the major part of a talk by James P. Gill, chief metallurgist of Vanadium-Alloys Steel Co., at the January meeting.

Occasionally Mr. Gill would digress to discuss some of the more recent steels such as the NE types, or such important points as complete transformation during hardening. The talk was well illustrated with slides showing composition of steels having special properties, and ingots from various types of molds.

The starting point for good steels is the charge used and most tool steel is now made in the electric furnace. Good practice continues during melting and tapping and is climaxed by pouring into the proper ingot molds so that sound ingots with a minimum of segregation are obtained.

High speed steel was discussed at length during the talk and in the question period. Subzero treatment, salt bath nitriding, and carburizing proved to be of general interest.

Apparently many users of the 18-4-1 type of high speed do not understand that hardness is developed on the first draw and that strains resulting from this transformation are relieved during the second draw.

Graphitic Steel Has Good Frictional, Machining, Wear Properties

Reported by John E. Comfort
Pacific Metal Co.

Oregon Chapter—Two very fine war films released by the U.S. Army Signal Corps, showing actual views of bombings, dog fights, and paratroop landings in the various war theaters opened the meeting on Feb. 11. A third film on "Tool Tipping" by the Timken Roller Bearing Co. preceded the address of the evening on "Graphitic Steels" by S. R. Kallenbaugh.

Graphitic steel is a steel containing free graphite, which imparts good frictional, high physical and excellent heat treating properties, in addition to free machining, high resistance to wear, and uniform structure. Graphitic steels may be divided into five separate grades known as: Graph-Mo, Graph-Tung, Graph-Al, Graph-M.N.S., and Graph-Sil.

Mr. Kallenbaugh further illustrated many points of his talk by colored slides taken in the Steel and Tube Division of The Timken Roller Bearing Co.

Review of Current Metal Literature—*Cont.*

22. WELDING, BRAZING, CUTTING

(Continued from page 9)

22-88. **Spot Welding.** *Automobile Engineer,* v. 34, no. 445, Jan. '44, p. 19.
Use with heat-hardened aluminum alloys.

22-89. **Tentative Weldability Standards for Alternate Aircraft Steels.** Aircraft Welding Standards Committee of the American Welding Society. *Welding Journal,* v. 23, Feb. '44, pp. 140-146.
Tests to compare proposed alternate steels with standard aircraft steels: Tee-bend test, transverse butt-weld tension test of ¼-in. plate, transverse butt-weld tension test of ⅛-in. sheet, welded double-tube triangle test, transverse butt-weld tension test of 1-in. tubing.

22-90. **Dual Pressure Systems as Applied to Resistance Welding Machines.** S. M. Humphrey. *Welding Journal,* v. 23, Feb. '44, pp. 135-139.
Method of applying a dual pressure sequence to resistance welding, if such a sequence were to be used in a precision welding machine.

22-91. **Automatic Arc Welding Solves Production Problems.** R. F. Wyer. *Welding Journal,* v. 23, Feb. '44, pp. 128-134.
Applications involving metal arc and atomic-hydrogen arc welding.

22-92. **Modern Welding and Structural Design.** Alois Cibulka. *Welding Journal,* v. 23, Feb. '44, pp. 124-127.
New inventions made possible by welding.

22-93. **The Modern Weldery.** Louis T. Kenney. *Welding Journal,* v. 23, Feb. '44, pp. 121-123.
Process of electric arc welding as a production tool.

22-94. **The Electric Welding of Aircraft Tubing at Noorduyn Aviation, Ltd.** Donn Boring. *Industry and Welding,* v. 17, Feb. '44, pp. 40-42, 44, 46-47.
Electric arc welding procedure used at Noorduyn Aviation, Ltd.

22-95. **Braze Welding an Engine Cylinder . . . Another Ship in Service.** *Industry and Welding,* v. 17, Feb. '44, pp. 78-80.
Repair of cylinder of a triple-expansion engine broken at sea.

22-96. **Pointers in Passing Navy Yard Welding Tests.** Joseph Schuman Wright. *Industry and Welding,* v. 17, Feb. '44, pp. 36, 38.
Principles to remember in taking test.

22-97. **Prefabrication of Welded Ships in a Structural Steel Fabricating Plant.** E. T. Blix and J. C. Arntzen. *Welding Journal,* v. 23, Feb. '44, pp. 105-107.
History and description of work of prefabricating at Mississippi Valley Structural Steel Co., Melrose Park, Ill.

22-98. **Production Spot Weld Testing.** James K. Dawson. *Welding Journal,* v. 23, Feb. '44, pp. 108-112.
Process of production spot weld testing. Test results, discrepancies, proposed tests.

22-99. **Arc Welding Builds Steady Rest for Lathe from Scrap.** S. Craig Cairns. *Welding Journal,* v. 23, Feb. '44, p. 112.
Material needed and procedure.

22-100. **Arc Welded Hydraulic Airplane Landing Gear Mock-up.** Henry Chasen. *Industry and Welding,* v. 17, Feb. '44, p. 33.
Construction of a mock-up hydraulic landing gear for airplanes for use by the Army in instructing students.

22-101. **The Control of Quality Workmanship—Plugging, II.** Robert Burnett. *Industry and Welding,* v. 17, Feb. '44, pp. 48, 50-51.
Definition and ways of eliminating plugging.

22-102. **Behavior of Welded Joints at Low Temperatures.** W. Spraragen and M. A. Cordovi. *Welding Journal,* v. 23, Feb. '44, pp. 97s-120s.
A review of literature to Jan. 1, '43. 82 ref.

22-103. **A Possible Application of Ultrasonics.** A. Behr. *Metal Industry,* v. 63, Dec. 31, '43, p. 422.
Application to welding and spot welding. 5 ref.

22-104. **High - Speed Soldering With Radio - Frequency Power.** John P. Taylor. *Electronics,* v. 17, Feb. '44, pp. 114-117, 232, 234.
Small metal containers, with bottoms and rings of solder in place, are carried along a moving belt and through an applicator coil at the rate of 2500 per hr. Localized heating induced in the metal causes the solder to flow and seals the bottom without endangering the capacitor.

22-105. **Drying Machine for Coated Welding Rods.** *Engineering,* v. 156, Dec. 31, '43, pp. 525-526.
Description of machine.

22-106. **Refrigerated Electrodes in Aircraft Welding.** *Tool & Die Journal,* v. 9, Feb. '44, pp. 104-106.
Description of the "Frostpoint" type of refrigerated electrode.

23. INDUSTRIAL USES AND APPLICATIONS

23-28. **Unit Skid Packaging Proves Efficient Handling Method in Producing Aircraft Engines.** George E. Stringfellow. *Steel,* v. 114, no. 6, Feb. 7, '44, pp. 130-134, 169.
Standard container for oil pumps. Mounted on plywood platforms, finished cylinder heads are carried from final inspection to stock in skid loads of 48 each. Crankcase cabinet serves as a handling unit from assembly to final inspection and for interplant shipments. Some carriers for handling small parts, adapted to varied sizes and shapes with wooden inserts. These are transported on skid platforms.

23-29. **Steel-Backed Mesh Sheet for Light-Rigid Structures.** *Product Engineering,* v. 15, no. 2, Feb. '44, pp. 73-75.
Mesh sheet is satisfactory for airplane side sections and is under investigation for other applications requiring strong, stiff constructions. Fabrication of airplane panels is described and other possible uses of reinforced low-carbon steel are reviewed.

23-30. **Stampings Joined by Brazing Make Low-Cost Sturdy Parts.** *Product Engineering,* v. 15, no. 2, Feb. '44, pp. 76-79.
Several outstanding illustrations of stamped and brazed sheet-steel parts for both war and peacetime

(Continued on page 11)

Steel Foundries Use Welding as Economical Production Tool

Reported by George G. Luther
Naval Research Laboratory

Washington Chapter—A popular local speaker received a warm welcome from the enthusiastic audience at the January meeting and he reciprocated by presenting one of the finest papers of the season. He was Howard F. Taylor of the Naval Research Laboratory, who spoke on "Steel Castings as Vital War Materiel".

Compared with the bronze casting field, the steel casting industry is relatively new, dating back some 75 years. In spite of the newness of the industry, it is safe to say, went on Mr. Taylor, that more progress has been made in the direction of obtaining sound castings than has been made in the cast iron or non-ferrous foundries.

Today progressive foundrymen eagerly use radiography for a foundry control tool, as well as in studying gating and risering practices.

Not the least important step in the progress of the casting field is the use of welding, not only in making repairs but, even more important, in fabricating large sections or ones with intricate shapes and changes of thickness. The use of flame cutting equipment in removing risers, gates, etc. was also mentioned as a highly appreciated foundry tool.

Mr. Taylor reminded the audience that the steel casting industry was first to adopt acetylene and arc welding as a regular production tool and employed staffs of skilled welders for that purpose. Cast-weld construction saves time, eliminates many bad molding problems and usually gives cheaper and more serviceable parts if used intelligently.

Flame gouging is another new and important addition to the foundry and finds particular usefulness in removal of shrinkage and similar defects.

The competition between castings and forgings should be decided largely by the particular application. Generally, castings lack directional properties and the initial first cost is low as compared to forgings made from dies. Some of the uses put to castings taking advantage of the lack of directional properties are in gun barrels, cast gears, and cylinder barrels for airplane engines.

Mr. Taylor quoted some interesting figures: 35% of the weight of a modern locomotive and 18% of the weight of a freight car are in steel castings. A one-piece casting, the side frame of a locomotive, replaced 27 separate parts that made up the old arch bar construction. The shock of traversing rail joints, crossovers and switches, the changes of climate and weather conditions are ably withstood by steel castings.

Centrifugal castings and precision casting by the lost wax process came in for some interesting comments by the speaker, as did the steps involved in the casting of ship propellers, shafting and aircraft parts.

Review of Current Metal Literature—*Cont.*

23. INDUSTRIAL USES AND APPLICATIONS

(*Continued from page 10*)

show the possibilities of combining these fabricating methods for producing sturdy, lightweight and economical designs.

23-31. Conveyors Help Build Bombsights on Schedule. *American Machinist*, v. 88, no. 3, Feb. 3, '44, pp. 105-114.
Efficacy of conveyors to speed mass production of bombsights along the main assembly line. Operators remove inspected subassemblies from the conveyor behind the bench, locate and dowel them to the die-cast frame of the T-1 computor, according to a picture routing placed at each station. Assembly is speeded by surface-plate bench tops.

23-32. The Construction of Airplane Landing Mats. Gordon Robertson. *Modern Machine Shop*, v. 16, Feb. '44, pp. 124-134.
The engineering that preceded the actual fabrication and finishing of portable airfield landing mats played a major role in securing high volume and high quality output.

23-33. Chemical Research for the Airplane Industry. O. H. York. *Chemical & Engineering News*, v. 22, Jan. 25, '44, pp. 86-88.
Problems in airplane manufacture which can be solved only by chemical research. Requirements of materials for aircraft construction are more exacting than for any other structure or machine. In airplanes more than in any other application there is absolute necessity for maximum strength combined with minimum weight.

23-34. Naval Gun Mounts From a Pacific Coast Shop. Charles O. Herb. *Machinery*, v. 50, Feb. '44, pp. 131-140.
Detailed description of the construction of gun mounts for rapid-fire 5-in. anti-aircraft guns by the Maywood shops of Consolidated Steel Corp., Ltd.

23-35. Production of High-Explosive Shells. *Machinery (London)*, v. 64, Jan. 13, '44, pp. 35-39.
Heat treatment, forging, and other operations required to produce finished shell bodies.

23-36. Manufacture of Sub-Assemblies for Wheeled Tanks. *Machinery (London)*, v. 64, Jan. 13, '44, pp. 29-31.
Description of the manufacture of sub-assemblies employed by Guy Motors, Ltd.

23-37. The Rawson Centrifugal Clutch Coupling. J. A. Holbrook, *Wire & Wire Products*, v. 19, no. 2, Feb. '44, pp. 120, 138.
Three couplings manufactured, sold and serviced by the Syncro Machine Co., Rahway, N. J.

23-38. Manufacturing Tails for Bombs. *Machinery*, v. 50, Feb. '44, pp. 180-184.
Description of manufacturing methods of bomb tails employed by a company in England.

23-39. Production Short-Cuts in Airplane Manufacture. Ralph H. Ruud. *Machinery*, v. 50, Feb. '44, pp. 141-146.
Unusual methods developed to meet production problems in aircraft building.

23-40. Fabrication of the T-1 Bombsight. Franklin M. Reck. *Aero Digest*, v. 44, Feb. 1, '44, pp. 118-120.
Ability of T-1 bombsight, currently in production at Flint, Mich., to adjust itself automatically to changes in altitude, speed, pitch, and role. Refinements introduced by the American manufacturer of the device.

23-41. Goodyear's Precision Assembly Jigs. D. P. Reynolds and C. R. Youmans. *Aero Digest*, v. 44, Feb. 1, '44, pp. 110-112.
Heavy jig frames are welded to massive floating base structures independently suspended on leveling jacks, and fittings are attached to the frames at dimensionally predetermined positions by use of surface plates, height gages, etc. Interchangeability is assured.

23-42. Basic Advantages of All-Plastic Dies and Die-Sets. David Cook. *Aero Digest*, v. 44, Feb. 1, '44, pp. 106-108.
Rapid development of all-plastic dies in answer to emergency war requirements; how their introduction has relieved critical bottleneck in aircraft production.

23-43. Fine Die Production in the United States. Winfield C. Moses. *Wire & Wire Products*, v. 19, no. 2, Feb. '44, pp. 118-119, 142.
Changes in the diamond die industry as a result of the war. Problems still to be solved.

23-44. A Comparison of Some Properties of Beams in Magnesium and Aluminum Alloys. *Magnesium Review and Abstracts*, v. 3, Oct. '43, pp. 107-114.
Comparison of some properties of uniform stable cantilever beams in the form of round or square bar, angle or T section, channel, I section or tube in magnesium and aluminum alloys, and presentation of the results in graphical form for quick reference.

23-45. An Adjustable Square-End Cropping Tool. Alan Keye. *Machinery (London)*, v. 64, Jan. 13, '44, pp. 40-41.
Description of the improved type of cropping tool.

23-46. Considerations Regarding the Post-War Utilization of Aluminum and Magnesium. L. W. Kempf. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 5 pp. (mimeo).
Pre-war use of Al in automobiles; marginal price for general use of Al; volume of secondary metal available; sources of Al; fabricating costs; use of Mg.

23-47. Propellers for Canadian Ships. *Canadian Metals & Metallurgical Industries*, v. 7, Feb. '44, pp. 18-21.
Highly developed foundry technique at the William Kennedy and Sons, Ltd.

23-48. Offset Tool Design Conserves Metal and Time. *Tool & Die Journal*, v. 9, Feb. '44, p. 121.
Method of making offset type Carboloy cemented carbide tools used by Thompson Aircraft Products Co., Euclid, Ohio.

23-49. Mechanical Problems of Permanent Magnet Design. Earl M. Underhill. *Electronics*, v. 17, Feb. '44, pp. 126-129, 374-376.
Alnico machining tolerances, casting allowances, choice of alloys, cost factors, methods of mounting and other mechanical problems related to electrical design of permanent magnets are taken up, with emphasis on practical data obtained through actual experience.

(Continued on page 15)

Cast Iron Subject of Joint Meeting With A.F.A.

Reported by James C. Erickson
Metallurgist, John Deere Plow Works

Tri-City Chapter—The January meeting, held jointly with the Quad-City Chapter of the American Foundrymen's Association, was addressed by V. A. Crosby, metallurgical engineer, Climax Molybdenum Co., Detroit. His subject was "Factors Affecting Properties of Cast Iron".

The properties of cast iron of constant composition depend upon (*a*) inherent properties of the raw materials used, (*b*) thermal treatment in melting and processing, (*c*) graphite pattern obtained in the gray iron, (*d*) alloying elements used, (*e*) pouring temperature, (*f*) heat treatment.

Physical properties as affected by thermal treatment in melting and processing were illustrated with a slide showing that both high temperature and correct processing are necessary for the optimum properties. Variation in tensile of 29,000 to 50,000 psi. was obtained in this manner.

The speaker emphasized the importance of graphite pattern on the mechanical properties of gray iron by showing micrographs and data to substantiate the correlation. Improvements in the order of 25% were not unusual when random type graphite was obtained.

It was shown that alloying elements contributed independent effects and that their selection should be predicated upon a knowledge of the properties desired. The speaker stressed the value for tensile strength of a small amount of three alloys rather than a similar total amount of one element.

MANUFACTURERS' CATALOGS IN REVIEW

Weights and Measures

Mesta Machine Co., Pittsburgh, Pa.

This is a handy, 63-page, spiral bound vest pocket book with many useful tables of weights and measures. The U. S. standard gages for iron and steel, tin plate gage, the relative sizes of ingots and forgings at various reductions, and a hardness conversion table are just a few of the many interesting features of this useful book.

Mention R104 When Writing or Using Reader Service

Ferro-Alloys

Ohio Ferro-Alloys Corp., Canton, O.

This leather ring-binder is a handbook of data designed as a ready reference for consumers of ferro-alloys. Manganese, silicon and chromium alloys are listed, and much of this 74-page book is devoted to such useful information as a glossary of technical terms, reduction table for some important oxides, the common names of chemicals, with their correct chemical names and formulae. The book also reproduces the "Contribution to the Study of Inclusions in Steel," by Portevin and Perrin.

Mention R105 When Writing or Using Reader Service

The Heat Treating Furnace

Surface Combustion, 2375 Dorr St., Toledo, O.

This booklet is a brief outline of the factors—tangible and intangible—which contribute to producing a good industrial furnace. In discussing the broad contributions of the heat treating furnace in the production of war materiel, Surface Combustion believes that this experience in war production will make possible better products, at less cost, after the war.

Mention R106 When Writing or Using Reader Service

695 Plastic Refractory

Basic Refractories, Inc., Hanna Bldg., Cleveland, Ohio.

Pointing to its increasing use in the steel industry, Basic Refractories says in this leaflet that 695 plastic refractory speeds up and improves installation of tap-holes, spout linings and many hot repairs. Typical applications and properties are cited.

Mention R107 When Writing or Using Reader Service

Salvaging Iron Castings

C. E. Phillips & Co., 2750 Poplar St., Detroit, Mich.

Repairs of iron castings by electric arc welding are discussed in this 12-page booklet, "4 Ways to Salvage, Reclaim and Conserve Iron Castings by Electric Arc Welding." Opening with a frank discussion on the inherent difficulties encountered in arc welding cast iron, it is pointed out there is no single welding material or procedure which can be recommended as a universal practice. Selection of a procedure for a specific application should be based on the requirements of the finished job. Four types of electrodes for use on cast iron are described, and the characteristics and best welding procedures for each are explained.

Mention R108 When Writing or Using Reader Service

Motorized Valves

Automatic Temperature Control Co., Inc.,
34 E. Logan St., Philadelphia 44, Pa.

Detailed engineering and application data covering ATC's line of high-speed motorized valves for "on-off" control of steam, air, oil, gas or chemical solutions, are presented in this leaflet. Construction and operating features fully illustrated and explained by simple table. Included are valve information and selection chart to assist in proper valve selection based on speed, stroke and operating power required.

Mention R109 When Writing or Using Reader Service

Electronic Control

General Electric Co., Schenectady, N. Y.

The fundamentals and various applications of electronic control are interestingly described in this new 12-page bulletin. Well illustrated, the booklet explains in clear, simplified language the fundamental principles of electronic tubes and their operation, describes the construction of the well-known thyratron tube, and lists the functions of eight of the more widely used industrial tubes. Many applications of electronic control are described.

Mention R110 When Writing or Using Reader Service

Controlled Friction

The General Metals Powder Co.,
130 Elinor Ave., Akron, Ohio.

This 12-page booklet shows how copper powder was combined with other powdered metallic and non-metallic ingredients to create an entirely new friction material. This material is said to be self-lubricating, to have a uniform coefficient of friction at all operating temperatures, long life, slow, even wear, smooth, vibration-free operation and controlled slippage.

Mention R111 When Writing or Using Reader Service

Metallurgical Laboratory Apparatus

Central Scientific Co.,
1700 Irving Park Rd., Chicago 13, Ill.

A great many scientific instruments and laboratory apparatus and supplies for laboratories of industry are described and illustrated in this 20-page booklet.

Mention R112 When Writing or Using Reader Service

High Frequency Induction

The Ohio Crankshaft Co.,
3800 Harvard Ave., Cleveland 1, Ohio.

How one large manufacturer saved more than 144,000 lb. of nickel in a year through adopting plain carbon steel and hardening it with the high frequency electrical induction process is one of many interesting cases cited in this revised 32-page booklet. Author of the publication, Dr. Harry B. Osborn, Jr., research and development engineer of the TOCCO Division, is a national authority on the induction process. His booklet is one of the most comprehensive descriptions on the ramifications of this industrial tool.

Mention R113 When Writing or Using Reader Service

Cleaners for Metal

Hanson-Van Winkle-Munning Co., Matawan, N. J.

This new bulletin deals with the selection and use of cleaners made from water solutions of alkalies, soap-alkali mixtures and soaps. These solutions are said to remove oils, greases and waxes of animal, vegetable and mineral (petroleum) origin, and the inert solid materials contained in them. These inert materials may be metallic chips or borings from machining, abrasive ingredients of polishing or buffing compounds, or various dirts incident to producing and fabricating the objects cleaned. A total of 19 special cleaners are described.

Mention R114 When Writing or Using Reader Service

Baskets, Tanks, Containers

Stanwood Corp., 4819 W. Cortland St., Chicago 39, Ill.

This 8-page booklet describes heat treating baskets, fixtures, retorts, oil bath furnaces, carburizing boxes and electric furnace elements, along with quenching tanks, baskets and complete units. Well illustrated, there are many pictures of pickling baskets and tanks, and containers for degreasing, washing and general handling.

Mention R115 When Writing or Using Reader Service

Industrial Furnaces

The Wellman Engineering Co., Cleveland 4, Ohio.

This 8-page booklet illustrates and describes industrial furnaces used for various heat treating purposes. Illustrated are heating furnaces for 2000-lb. high carbon, alloy and stainless steel ingots; a 12-hole soaking pit; an oil-fired car-type furnace for stress relieving sheet metal weldments; and an oil-fired stress relieving and annealing furnace for one of the large shipyards.

Mention R116 When Writing or Using Reader Service

Punching Sheet Metal

Wales-Strippit Corp.,
345 Payne Ave., North Tonawanda, N. Y.

This large pictorial brochure describes the plate set system for punching sheet metal. A self-contained punching assembly, this system is available in standard sizes or may be built to specifications quickly. Assemblies are placed on a press bed, operated, and quickly removed, thus keeping the press in continuous operation. Hundreds of holes can be accurately pierced at one stroke of the press ram.

Mention R117 When Writing or Using Reader Service

Cleaning Ferrous Metals

Oakite Products, Inc.,
22 Thames St., New York 6, N. Y.

This field service report discusses a new development in acid-type detergents, Oakite Compound No. 86, primarily designed for use in pressure-type washing machines. It is said to perform three important functions in one operation: Remove grease, oil and shop dirt from steel; impart a microscopic crystalline coating to surfaces that provides a base for firm adhesion of paint, enamel, lacquer and similar types of organic finishes; and prevent rusting of steel parts between operations and prior to painting.

Mention R118 When Writing or Using Reader Service

Precision Gaging Equipment

Metrical Laboratories, Inc.,
417 Detroit St., Ann Arbor, Mich.

Metricator gages for precision measurements of internal and external diameters, taper, straightness, concentricity and a variety of special applications are described in this new literature. Simplicity of operation and long maintenance of accuracy in spite of wear are said to be important advantages of this equipment in the inspection and production of quality products requiring close tolerances.

Mention R119 When Writing or Using Reader Service

Government Material for Sale

RAW AND FABRICATED MATERIALS, standard parts, motors, hardware, fabrics, precision tools, equipment, and other surplus stocks are being offered for sale by the Army Air Forces. Companies interested in such materials, and who are desirous of having their names placed on the active bidders' list, are invited to write to the Army Air Forces, Materiel Command, Midcentral Procurement District, 111 West Jackson Blvd., Chicago 4, Ill., attention of Redistribution and Salvage Section.

Employment Service Bureau

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated

Positions Open

MATERIALS ENGINEER: Should be college graduate with major in metallurgy, physical chemistry, or chemical engineering preferred. About three years industrial experience, and sound understanding of physical metallurgy. East. Box 3-5.

INDUSTRIAL FURNACE DESIGNER: Experienced, preferably but not necessarily in electric furnaces. Experience on mechanical handling and quenching equipment of particular value. Situation should interest one looking ahead to post-war prospects. Generous pension plan. All details education, experience, salary and photograph first letter. Ajax Electric Co., Inc., Frankford Ave. at Delaware Ave., Phila., 23, Pa.

METALLURGISTS: Top-notch; two, one for Chicago plant and one for Birmingham, Ala., plant fabricating metal containers. Degree from recognized college; must be capable of supervising metallurgical assistants and checking tests made, writing specifications, and conducting certain amount of research and development work. Salary open. Box 3-10.

METALLURGICAL ASSISTANTS: Two for Chicago plant fabricating metal containers. Two years of college or equivalent in metallurgical laboratory experience. Must be able to conduct metallurgical tests and experiments on steel. Salary open. Box 3-15.

ESTIMATOR ON STEEL FORGINGS: For large midwestern forge plant engaged in war work. Must be able to do complete job of estimating and rate computation. Well-rounded experience and education necessary. Excellent post-war opportunity. Give full details in first letter. Box 3-20.

METALLOGRAPHER: College graduate for quality control of materials used in a manufacturing ordnance plant in Chicago. Some practical experience in metallography of both ferrous and non-ferrous metals. Should be able to investigate production metallurgical problems with a minimum of supervision. Box 3-25.

METALLURGIST: For research work in Cleveland area on powder metallurgy and beryllium. Physicist's background preferred but not essential. This war and post-war position presently believed to warrant draft deferment. Box 3-30.

METALLURGIST: For control of acceptance of alloy steels and heat treating processes in a progressive, long established, midwest manufacturing concern having a diversified line of post-war importance. At least four years' college training and two to five years' experience required. Preference given to men under 30 years whose record shows ability to merit rapid advancement. Box 3-60.

Positions Wanted

METALLURGICAL CHEMIST: B.S. in Ch.E., M.S. in Met. Eng.; age 33. Nine years' experience in laboratory procedures, steel melting and fabrication and heat treatment. Desires position with reliable company offering attractive post-war possibilities. Will consider teaching in well-established metallurgical school. A practical man with a sound background of technical knowledge. Box 3-35.

METALLURGIST: Engineering graduate of accredited school with seven years' experience. Excellent knowledge of heat treatment of steels and equipment employed. Good background in metallography. Good working knowledge of machine shop practice. Experienced supervisor. Box 3-40.

METALLURGICAL ASSISTANT: Experience in centrifugal casting of steel, laboratory development, metallography, heat treatment, inspection and production; also physical testing and inspection of tin plate. Honorable discharge from Air Corps; draft classification 1-C. Would like overseas work with an American company, preferably in South America. Box 3-45.

ELECTRICAL ENGINEER: University of Minnesota, 1941. Experience in drafting room, shop, and in the field; design, layout, manufacture, assembly and supervision of the installation of electrical and its associated equipment; welding, structural, piping and machine shop departments. Would like position in production or development section of industrial concern either in East or far West. Box 3-50.

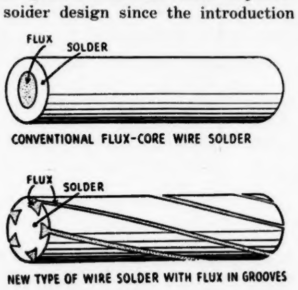
TECHNICAL OFFICE WORK: Young lady with courses in non-ferrous metallurgy, non-ferrous metallography, mathematics and chemistry at Michigan College of Mining and Technology, training in typing and shorthand, would like position combining office experience and technical training; laboratory technician also considered. Midwestern area preferred, but not essential. Box 3-55.

NEW PRODUCTS IN REVIEW

Fluxed Wire Solder

National Lead Co.,
111 Broadway, New York 6, N. Y.

A new type of fluxed wire solder, which contains flux in longitudinal grooves on the surface rather than in the conventional core, has just been placed on the market. It is said the product represents the first basic improvement in fluxed wire soider design since the introduction of this type of material a number of years ago.



Called Fluxrite, this new material overcomes completely an inherent disadvantage of regular cored solders which supply flux and solder to the surface simultaneously, it is claimed. Since the flux in the new product is outside rather than inside, it liquefies and flows onto the work before the solder melts. This insures thorough and complete fluxing and results in stronger and better solder joints. Then, too, since the new product has more than one flux-filled groove, an unbroken flow of flux is guaranteed. The flux supply being outside the wire, it is always visible to the user and can be checked quickly and readily. Fluxrite comes in the same diameters as regular cored solder, and in two compositions designated as Red Stripe and Green Stripe.

Mention R120 When Writing or Using Reader Service

Tocco Induction Machine

The Ohio Crankshaft Co.,
3800 Harvard Ave., Cleveland 1, Ohio.

Departing somewhat from the conventional design of high frequency units, this company has introduced a new low-cost 7½-kw. output Tocco Junior induction machine which features a work unit separate from the power unit. If desired, the mobile top can be moved to facilitate shop operations. It is connected to the power unit by a cable that need not be limited as to length.

This newest unit provides a wide range of induction heating for brazing, annealing, heating for forming and for hardening small parts. Because it is especially designed with the brazing of carbide tipped tools in mind, the small machine is ideally suited for use in a shop tool room.
ideally suited for use in a shop tool room. Work

Mention R121 When Writing or Using Reader Service

Unit Dust Collector

Pangborn Corp., Hagerstown, Md.

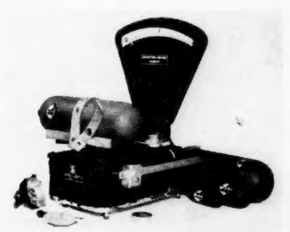
This new self-contained unit dust collector provides construction and performance consistent with the requirements of industrial operations and should not be confused with the small, low volume units. Of particular importance is the flexibility in arrangement permissible for adaptation to specific plant conditions. The unit consists of two major sections—a preliminary centrifugal section and a secondary cloth screen section. Dust laden air enters the centrifugal section where, due to a reduction in air velocity and centrifugal action, the bulk of the entrained material is separated from the air stream. The air, containing only the finely divided dust particles, then flows upward to the secondary cloth screen section where the fine dust is effectively filtered from the air. The cleaned air thence passes to the exhauster and is discharged.

Mention R123 When Writing or Using Reader Service

Industrial Fan Scale

Detecto Scales, Inc., 1 Main St., Brooklyn 1, N. Y.

A new Detecto-Gram industrial fan scale has been constructed on the time-proven even balance principle with the reading dial at one end of the base and commodity platter at the other end, with the weight plate in the middle. This permits all three vital points concerned with the weighing to be in direct line of vision with the operator, thus speeding up the weighing operation, and at the same time assuring a maximum of accuracy.



These scales are available without beams for direct weighing purposes where weights are employed. This model is also made up with one beam or two beams. The tare beam which is used to account for the weight of the empty container is fitted with a small adjustment ball to permit the adjustment of the slightest fraction of an ounce. Special dials are made for specific purposes, and a choice of five standard dials from a 1-lb. by 0.01-lb. dial to a 1000-gram by 5-gram dial. Immediate delivery.

Mention R124 When Writing or Using Reader Service

Arc Stabilizer

Westinghouse Electric and Mfg Co., East Pittsburgh, Pa.

Welding of thin metals—so much of which is being done by aircraft builders—requires small electrodes. Low welding currents are also necessary to keep from burning the thin sheet, according to Westinghouse engineers. Under these conditions, the a-c arc becomes unstable and tends to go out easily, frequently spoiling the weld.

This problem was solved by superimposing a high-frequency voltage wave (about 250 kilocycles) on the welding current. This voltage keeps the arc stream ionized during the reversals of low-frequency (60-cycle) welding current. Functioning as an arc stabilizer, the high frequency provides firm control of very small welding currents.

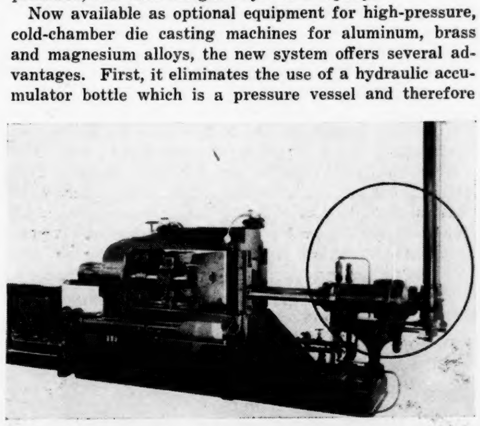
Mention R125 When Writing or Using Reader Service

Improved Die Casting Machine

Lester-Phoenix, 2711 Church Ave., Cleveland 3, Ohio

New "pre-fill" injection system which is said to eliminate the necessity for hydraulic accumulators on die casting machines and greatly improve quality of die castings produced, has been designed by this company.

Now available as optional equipment for high-pressure, cold-chamber die casting machines for aluminum, brass and magnesium alloys, the new system offers several advantages. First, it eliminates the use of a hydraulic accumulator bottle which is a pressure vessel and therefore



inherently dangerous, according to this company. Second, it steps injection pressure up as high as 33,000 psi. in the production of 3-lb aluminum castings, and it holds this pressure on the injected metal as it chills in the die. This is known as the "slow squeeze" injection method, wherein the molten metal is injected into the die slowly, so air and gases can escape ahead of it. Then after the die cavities are filled, a high injection pressure is applied on the metal as it chills, thereby preventing the formation of shrinkage voids and reducing any entrapped air or gas to a minimum in volume, making denser and stronger castings.

The pre-fill system consists of a hydraulic cylinder fitted with a large actuating piston, the hollow piston rod of which contains a passageway to a smaller inner fixed piston. Oil under 1000 psi. hydraulic pressure is introduced through the hollow piston rod, displacing at high velocity the small piston opposing it, which piston also carries with it in its forward movement the piston rod and the attached main or large piston. As the latter moves forward at high speed, oil flows by gravity from a vertical storage tank through the pre-fill check valve to occupy the space back of the large piston. When the die cavities have been filled, 2000 psi. oil pressure from a booster pump is applied directly to both pistons, resulting in high sustained final injection pressure which packs the metal into the die. When the injection piston reverses, the oil is returned to the gravity tank and oil pump, ready for the next cycle.

Mention R126 When Writing or Using Reader Service

Core and Facing Binder

Bondite Corp., 2325 E. 38th St., Los Angeles 11, Calif.

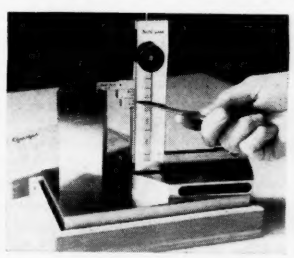
A new, dry type foundry core and facing binder of hydrocarbon base has just been announced by this company, which says the proper use of Bondite will save binder and new sand expense. It will produce cleaner castings and increase production in steel, iron and brass. Bondite weighs only 4 lb. per gallon. On ignition, it produces a carbon type gas that covers surface grains, giving them a protective coating against metal action.

Mention R127 When Writing or Using Reader Service

DoAll Vernier Gage Blocks

Continental Machines, Inc.,
1301 Washington Ave., S., Minneapolis 4, Minn.

In announcing the new DoAll Vernier Gage, the company says that heretofore gage blocks, whether in small took-maker sets or large complete sets of over 80 blocks, were limited to the combination which could be made in increments of 0.0001 in. Industry's trend toward finer tolerances now necessitates precision measurements in increments as fine as 0.000001 in. The DoAll Vernier Gage simply and effectively extends the range of combinations of sizes which can be made with any set of gage blocks by enabling combinations to be made in steps of ten micro-inches and to the same degree of accuracy as provided by precision gage blocks.



It is said the added versatility of a set of gage blocks used in combination with the DoAll Vernier Gage greatly reduces costs of producing special gages where the dimensions must be held to split tenth accuracy.

Mention R128 When Writing or Using Reader Service

(More New Products on page 14)

NEW PRODUCTS IN REVIEW

Heat Treating Unit

Waltz Furnace Co.,
2453 Gilbert Ave., Cincinnati 6, Ohio.

Designed to do a complete heat treating job, this new combination unit has a high temperature hardening furnace shown on the left in the illustration, quench tanks in the center and a recirculating draw furnace on the right. Known as model CH, this unit is made in three sizes, 8 in. wide x 6 in. high x 12 in. deep; 10 x 8 x 15 in.; and 12 x 10 x 18 in.

Temperature in the hardening furnace is automatically controlled by an indicating pyrometer that can be hand set to hold any temperature in the range of 1350 to 2300° F. Within the muffle, or heating chamber, a

protective atmosphere can be introduced, which is controlled by the two valves located beneath the gages shown. These gages make it possible to duplicate the atmosphere once the type needed has been established. Efficiency is maintained by 7-in. thick walls of firebrick and block insulation.

There are two quench tanks in the center of the unit, the small one for oil and the large one for water, the water entirely surrounding the oil tank through double walls. There are perforated baskets in both tanks.

The recirculating draw furnace has a range of 250 to 1100° F., which is controlled by an automatic indicating pyrometer similar to that on the hardening furnace. Hot air for tempering is recirculated by a high velocity alloy steel fan located in the base.

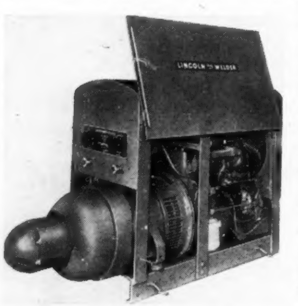
All equipment necessary for operation is located inside the base and easily accessible. Entire unit ocupies 33 x 98 in. floor space, requires but a gas and power connection.

Mention R130 When Writing or Using Reader Service

Engine-Driven Arc Welder

The Lincoln Electric Co., Cleveland, Ohio.

A new "Shield-Arc" engine-driven welder rated at 200 amperes of light-weight, rugged construction with powerful enclosed, rubber-mounted engine of 29 horsepower, is announced by this company. Supplied complete with base and canopy, as illustrated, new unit has a current range of 40 to 250 amperes. Dual control of welding current is accomplished by adjustment of series fields and generator speed.



For metallic arc welding, with bare or coated electrodes, new model also supplies uniform welding current for carbon arc welding. The generator control or "job selector" assures accuracy of open circuit voltage and permits precise control of engine speed of from 1500 to 1150 r.p.m. for welding. In addition, this control may be used to manually reduce the engine speed to as low as 750 r.p.m. whenever it is necessary to stop welding at intervals of a few minutes.

With this unit, an engine speed of from 1150 to 1400 r.p.m. is used for the majority of welding applications thus assuring longest possible life of the equipment.

Mention R131 When Writing or Using Reader Service

Zinc Plating Solution

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Interest in zinc is said to be great because it is being substituted for cadmium coatings on many articles that must be protected against corrosion. A special alkaline solution has been developed by this company with which is used S-B Addition Agent for producing satin-bright to bright deposits, the degree of luster said to depend on the choice of operating conditions.

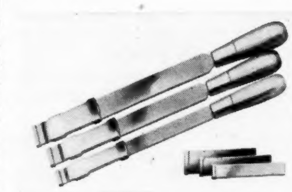
In unagitated solutions, the cathode current density range is from 10 to 45 amp. per sq. ft. Maximum brightness is obtained with the solution temperature maintained at 70 to 75° F. Deposits are somewhat lustrous as they are taken from the plating bath. A satin-bright to full-bright finish is produced by dipping the work momentarily in a ½% nitric acid solution.

Mention R132 When Writing or Using Reader Service

Tipped Scraper Blades

Anderson Bros. Mfg. Co.,
1907 Kishwaukee St., Rockford, Ill.

Carboloy - tipped scraper blades are now available in three widths to fit the Anderson standard line of hand scrapers. It is only necessary to remove the high-speed steel blade and slip in the Carboloy tipped blade. These are said to last from eight to ten times longer than the ordinary blade.



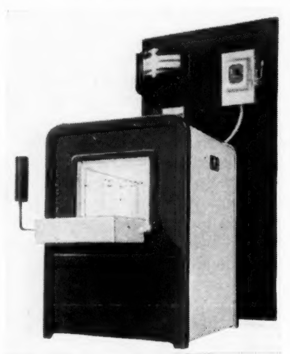
Mention R133 When Writing or Using Reader Service

Small Heat Treat Furnaces Aid War Manufacturing

Cooley Electric Mfg. Corp., Indianapolis, Ind.

Small electric heat treating muffle furnaces are said to be widely used in the manufacture of war products, especially smaller parts which are handled in less time and expense in these furnaces. This company produces two sizes of small, electric muffle furnaces for economical and fast heat treating of small parts, drawing, or tempering small lot runs, normalizing or annealing, pre-heating for subsequent high speed hardening, and for emergency repair orders where one or two parts must be heat treated in a short time. These heat treating units are also used as auxiliary equipment to larger furnaces.

A large variety of products and different uses have been found adaptable for the electric heat treating furnace in manufacturing war equipment. For example, a heavy automotive equipment manufacturer uses this muffle furnace with automatic control in its laboratory. Proper heat treating procedure is determined for each part produced by this company before it goes into production. Their various tools and dies undergo the same procedure. Test bars and Jominy end-quench hardenability tests are also handled to determine results produced under hardening processes. It is also used for drying samples for nickel determinations and for chemical analysis of silicon determination. This laboratory equipment is used at critical temperatures throughout its entire range from 150 to 1800° F.



For general industrial purposes the electric heat treating furnaces are made in two chamber capacities—8 in. wide, 6 in. high, by 14 in. deep; and 10 x 6 x 18 in.

Mention R134 When Writing or Using Reader Service

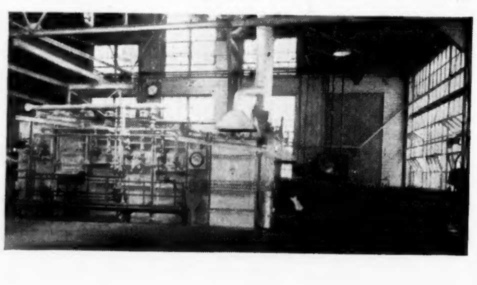
Copper Bar Heating Furnace

W. S. Rockwell Co., New York, N. Y.

Until the development of the Rockwell continuous heating method for copper wire bars, existing mill practice was said to have suffered from a lack of coordination between heating and handling rate to meet the needs of the first pass through the mill. This difficulty involved improper heating or overheating of bars, failure to feed hot bars to the mill at a uniform rate, so that time and labor were lost which were multiplied down the line of subsequent mill passes, back-up of bars in the furnace, causing too much heating, and on the charging tables before the furnace.

This furnace was designed to iron out production flow into and from the furnace so as to synchronize delicately with the desired rate of charging and the rate of bar feed to the mill. Furnace illustrated is about 22 ft. long and 10 ft. wide, designed to handle two rows of 63 wire bars of 250 lb. each per row, in a 1¼-hr. heating time. However, it can heat at a 25% higher rate, if pushed. (This size and capacity is a variable which is dependent on individual requirements). Production is thus approximately 25,000 lb. per hr., with a fuel (natural gas) consumption of 0.35 cu. ft. per lb.

Handling method consists of a 20-ft. charging table on which the bars are placed, an oil-operated hydraulic pusher mechanism and two rows of water-cooled skids for



each row of bars in the furnace. Gas burners are located on both sides of the heating and soaking zones and at the discharge end. Auxiliary oil burners are installed in the event of need for changeover. Automatic temperature control is provided so that the burner operation is coordinated with the flow of the bars.

Mention R135 When Writing or Using Reader Service

Hydraulic Presses

The Hydraulic Press Mfg. Co., Mt. Gilead, O.

During the war, the forming of sheet metals has been the big job of the metal aircraft builders and their many sub-contractors. It has been necessary for these manufacturers to augment their sheet metal forming equipment.

In less than one minute,, the airplane upper tank section illustrated is drawn from a flat blank to the required shape. An H-P-M Fastraverse deep sheet metal drawing press is employed. Previous to the installation

of the hydraulic press, such parts are said to have been formed with drop hammers, at a rate of one tank section every two hours.

It is logical to assume that when peacetime production is again under way, the blankholder deep metal drawing press will find wide use in all sheet metal forming, embossing and drawing fields. The type of sheet metal to be drawn is of little consequence, as the hydraulic blankholder press will handle all types with equal efficiency. With the possibility of more and more light gage aluminum alloy sheet being used after the war, it is quite natural to expect that a rubber pad forming press will be used to good advantage, especially to keep consumer prices as low as possible. One of the big factors in the price of pre-war articles was the high cost of dies. This problem has been eliminated by the hydraulic rubber pad forming press.

The hydraulic press is also pioneering other metal working applications which will prove beneficial for postwar production. Prominent among these presses are the ones used to form powdered metals; others include die casting machines for magnesium and aluminum.

Mention R136 When Writing or Using Reader Service

Portable Heating Tanks

Youngstown Miller Co., Sandusky, O.

One of the many special kinds of special heating tanks now being built by this company is shown here. This particular machine is portable and consists of a well-insulated heating tank equipped with electric heaters — a motor and pump for circulating the oil— thermostats for maintaining the oil temperature within certain limits—complete with electric controls, valves, all mounted on casters.

As builders of a complete line of oil reclaiming equipment, the manufacturer has incorporated many of the features of these machines in these heating tanks.

Mention R137 When Writing or Using Reader Service

Cutting Oil Compound

Fearless Oil Co.,
325 W. 11th St., Los Angeles 15, Calif.

A cutting oil compound for use in cutting high speed tool steels, chromium-molybdenum, and the new NE alloys is announced by this company. Mixture of animal oils and other chemical ingredients, this oil is claimed to increase tool life 2 to 6 times before regrinding is necessary; to increase production from 25 to 100%; to allow a much higher cutting speed; eliminate squealing; cut down overheating; and to give a finish superior to other compounds. Developed in the company's own shops, the compound is particularly recommended for tapping operations where clean threads or higher cutting speeds are needed.

Mention R138 When Writing or Using Reader Service

Metal Literature Review—*Continued*

23. INDUSTRIAL USES AND APPLICATIONS

(*Continued from page 11*)

23-50. Reclamation of Automotive Valves. Norman Hoertz. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 8 pp. (mimeo).
Valve repair requisites for repair and renewal of valve faces and stems: good preparation, welding skill, smooth flowing rod; skilled grinding and machining.

23-51. Blowing Bubbles. Tully D. DeStefani. *Die Casting*, v. 2, Feb. '44, pp. 35-36.
Use of tin base alloys in soda fountain equipment. Advantages of die casting process.

23-52. Conveyors Aid Reconditioning of Tool Sets. *Iron Age*, v. 153, Feb. 24, '44, p. 71.
Tool control system to increase efficiency in grinding, inspection, storage, maintenance, salvage and disbursement of cutting tools at Grand Rapids Stamping division of Fisher Body Co.

23-53. Metals and Alloys Used in Construction of Woven Wire Conveyor Belts: II. S. Craig Alexander. *Industrial Heating*, v. 11, Feb. '44, pp. 198, 200, 202, 204, 206.
Detailed discussion of the composition and properties of the numerous metals, and applications for which they are suited.

23-54. Shiftable Bevel Gears. *Die Casting*, v. 2, Feb. '44, pp. 23-24.
Design of die cast gears.

23-55. Fabrication of Annealing Covers, Pressure Vessels and Galvanizing Kettles at the National Annealing Box Co. W. N. Robinson. *Steel Processing*, v. 30, Feb. '44, pp. 83-87.
Description of the National Annealing Box Co. plant, Washington, Pa., and details of their construction processes.

23-56. Production of the M-1 Type of Helmet. *Steel Processing*, v. 30, Feb. '44, pp. 106-108, 110.
Description of the manufacture of the new American M-1 type helmet being turned out by the McCord Radiator & Mfg. Co., Detroit.

23-57. Fire Blankets. Henry Heigis. *Die Casting*, v. 2, Feb. '44, pp. 18-22.
Cylinders for use with CO_2 fire extinguishers are tested at 3000 psi. or more. Die cast parts must meet very high physical standards.

24. DESIGN

24-4. An Approach to Functional Design Standards. Roger W. Bolz. *Modern Machine Shop*, v. 16, Feb. '44, pp. 178-188.
Functional simplicity and standardization in design, taking into consideration the problem of (1) the amount of machining or processing required, (2) simplicity and economy in tooling for machining operations, (3) ease and economy in assembling, and (4) simplicity of servicing, can thus effectively result in a product having superior design characteristics, closely adapted material requirement and production facilities, and last, but not least, lower total costs.

24-5. Simplified Method for Designing Beam Sections—II. William L. Govan. *Product Engineering*, v. 15, no. 2, Feb. '44, pp. 121-123.
Procedure for checking and adjusting the preliminary proportions of beam sections as obtained by the equations developed in Part I, with a summary of the complete method for designing a satisfactory section. Practical design considerations are enumerated which may dictate modifications in final proportions.

24-6. Designing Single-Plunger Injection Pump. Raymon Bowers and R. E. Peterson. *Machine Design*, v. 16, no. 2, Feb. '44, pp. 174-176, 238-244.
Description.

24-7. Hydraulic Cylinder Design. W. W. C. *Machinery (London)*, v. 64, Jan. 13, '44, pp. 44-45.
Design procedure.

24-8. Design and Application of Phenolic Composition Bearings. O. K. Graef. *Machinery Lloyd*, v. 16, Jan. 8, '44, pp. 49-53.
Bearing composition; properties and design fundamentals.

24-9. Rational Design of Fastenings. E. S. Jenkins. Preprint. War Engineering Annual Meeting, S.A.E., Detroit, Jan. '44, 14 pp. (mimeo).
Results are of interest with relation to cemented joints and give a quality insight to behavior of discontinuous joints. Tearing stresses are partially responsible for failure of edge fasteners in spotwelded connections. Important in determining fatigue characteristics.

24-10. Design It Correctly—II. Marc Stern. *Die Casting*, v. 2, Feb. '44, pp. 15-17.
Good design practice in various parts of a die casting.

25. MISCELLANEOUS

25-21. Mining Geology. H. J. Fraser. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 55-56.
Geologists have been kept busy on search for strategic mineral deposits for immediate development.

25-22. Reclamation of Cutting Oil. Adam T. Krol. *Iron Age*, v. 153, no. 5, Feb. 3, '44, pp. 59-61.
Reclaimed by centrifuging, settling, filtering or by a combination of any one of these methods and subsequently made ready for service after concentrates and disinfectants have been added.

25-23. Projection Methods for Reproducing Templates. Thomas Miles. *Product Engineering*, v. 15, no. 2, Feb. '44, pp. 130-133.
When and where to use methods involving cameras for reproducing templates are discussed in this second article of a series. Featured in this installment is a description of a vertical precision camera designed and built by the author.

25-24. Insure Long Tool Life by Correct Handling. Harry Crump. *Steel*, v. 114, no. 6, Feb. 7, '44, pp. 140, 176.
Careful handling, storage.

25-25. How One Plant Cuts Its Costs by Recovering Solvents and Oils. E. A. Reehl, *Steel*, v. 114, no. 6, Feb. 7, '44, pp. 126-127.
Materials worth 26 cents per gallon are recovered in a metal-working plant at cost of only 5½ cents per gallon; net profit from reclamation is thus 20½ cents per gallon—almost a 400% return on cost of the operation.

25-26. Characteristics of Plastics as Engineering Materials. W. F. Bartoe and D. S. Frederick. *SAE Journal*, v. 52, no. 2, Feb. '44, pp. 54-61.
Low density, ease of fabrication, low thermal conductivity, available transparency, and low unit cost for mass production items are characteristics of organic plastic materials that make them attractive to the designer and the engineer. Before full use of plastics can be made, however, it is necessary for both the designer and the engineer to have an extensive practical tabulation of their chemical and physical characteristics. Today's cut-and-try methods used with plastics must give way to theoretical design considerations. The authors of this paper have outlined those things that should be considered in every application with plastics, illustrating their point with pertinent data on the thermoplastic resin known as Plexiglas.

25-27. Progress in Engineering Knowledge During 1943. P. L. Alger and James Stokeley. *General Electric Review*, v. 47, no. 2, Feb. '44, pp. 9-13, 17, 29, 33, 42.
Surface chemistry, plastics and elastomers, phosphorus metallurgy, electron microscopy, conservation, standardization, quality control, welding, mechanical engineering, turbines, transformers, switchgear, synchronous machines, direct-current machines, control, aircraft equipment, appliances, radio, X-rays, television, measurement, power systems and transmission, lightning, capacitors, cables, power distribution, overcurrent protection, relaying, carrier current, industrial power, rectifiers, air conditioning, lighting. 47 ref.

25-28. Broken Drills Removed with Dynamite, *Iron Age*, v. 153, no. 6, Feb. 10, '44, p. 73.
Salvage procedure for removing broken drills from oil holes of precision made crankshafts.

25-29. Conservation in the Ordnance Department of the Army Service Forces. Thornton Lewis. *Mechanical Engineering*, v. 66, Feb. '44, pp. 119-120.
Saving of critical materials as well as a reduction in machine hours and over-all cost. Some illustrations given are: Replacement of circular steel strips on bombs by laminated impregnated paper bands secured by a light steel strip and mechanical solderless method of crimping windshields on armor piercing shot. Use of plastics to replace critical metals and the use of wood as a metal substitute.

25-30. Metallic Materials. H. W. Gillett. *Steel*, v. 114, Feb. 14, '44, pp. 110-119.
Progress can be made when design engineer, metallurgist and testing engineer meet on common ground. Gillett proposes outline for use in selecting material best suited for a given application and discusses relative merits of various types. 26 ref.

25-31. United States Navy Promotes Standardized Pallet Handling. C. H. Barker, Jr., and G. W. Birdsall. *Steel*, v. 114, Feb. 21, '44, pp. 78-79.
It increases moving and storing efficiency; enables power fork trucks to lift and carry loads; reduces damage losses during shipment and in storage; will cut manufacturing and distributing costs in postwar era.

25-32. Engineering a System for "Engineering." John T. Davidson. *Machine Design*, v. 16, no. 2, Feb. '44, pp. 135-139, 246.
How to organize an automatic system for the effective utilization of inexperienced personnel in the performance of "engineering's" many routine tasks.

25-33. Formular Aids Calculation of Curve Length. M. W. Powell. *Machine Design*, v. 16, no. 2, Feb. '44, pp. 181-182.
Accurate determination of curved lengths such as tubing, conduit, airplane wing contours, structural sections, etc., can be effected quickly through use of the approximate formula presented in this data sheet. The only measurements required are the chord length and the angle between the tangent lines at the two ends of the curve. When applied to a range of circular arcs up to 90° subtended angle the maximum error is less than 0.03%.

25-34. What's a Good Yardstick for Patentability? George V. Woodling. *Machine Design*, v. 16, no. 2, Feb. '44, pp. 171-173.
The attempt to create a scale for invention.

25-35. Plant Maintenance and Rehabilitation — Heavy Equipment. Arthur B. Eastman. *Industry and Welding*, v. 17, Feb. '44, pp. 60-63, 65-66, 68.
Description of mold designed to increase present plant production at Continental-Diamond Fibre Co.

25-36. Hull Steel Foundries, Ltd., Equips Service Building With Latest Conveniences. *Blast Furnace and Steel Plant*, v. 32, Feb. '44, pp. 241, 276-277.
Description of building.

25-37. Quantity Control. *Automobile Engineer*, v. 34, no. 445, Jan. '44, pp. 12-14.
Various factors involved.

25-38. Bomb Manufacture Speeded by Mechanical Handling Methods. W. V. Casgrain and L. J. Bishop. *American Machinist*, v. 88, no. 4, Feb. 17, '44, pp. 105-116.
Delivered to heating furnaces; forged in three operations; quenched two at a time; bored and tapped at five stations.

25-39. War Industries May Alter South Africa's Peacetime Economy. Benjamin W. Corrado. *American Machinist*, v. 88, no. 4, Feb. 17, '44, pp. 88-90.
Its wartime industrialization, helped by American and British tools, provides sound post-war opportunities for South Africa regardless of the gold standard.

25-40. Metallurgical Developments in Brazil. *Iron & Steel*, v. 17, no. 5, Jan. '44, pp. 218-219.
A new outlook on industrial relations and new techniques of industrial economy, form a firm foundation for developing Brazil's vast natural resources.

25-41. Removal of Broken Tools from Machined Parts by the Elox Method. H. V. Hardening. *Tool & Die Journal*, v. 9, Feb. '44, pp. 83-85.
Description of the Elox disintegrating equipment for removal of broken tools.

25-42. Procedures in Plastics. *Tool & Die Journal*, v. 9, Feb. '44, pp. 94-95, 97-99.
Fundamentals of procedures in plastics; advantages and disadvantages.

25-43. Jet Moulding. *Tool & Die Journal*, v. 9, Feb. '44, pp. 100-101.
Process for the injection molding of thermosetting (as well as thermoplastic) materials.

(Continued on page 16)

Rigid Specifications for Spring Wire Insure Quality

Reported by H. P. Henderson
Prod. Engr., New Departure Div., G. M. C.

Hartford Chapter—Medium and high carbon steel, mostly of straight carbon types, forms the bulk of spring manufacture, although some alloy steel such as chromium-vanadium is often used, according to George G. Wilcox, chief metallurgist and chemist of the Wallace Barnes Co., speaking at the February meeting on "The Metallurgy of Springs".

The speaker explained the care and methods employed to met rigid specifications for spring wire to insure neither breakage nor setting in springs. Constant checking for grain size, graphitizing effects and particularly surface conditions of stock throughout the manufacture are responsible for the long life of springs under such severe conditions as found in airplane engines.

Mr. Wilcox had slides showing heat treating processes employing the triple lead bath continuous hardening method, which is in reality "martempering". The sections of springs being small enough, good depth of hardening is possible.

Operations of polishing, coloring, and such effects as accelerated aging and the results on tensile strength due to drawing and patenting were explained by the speaker.

Mr. Wilcox particularly stressed the fact that since greatest tension is found on the surface of a spring, particular attention must be paid to surface defects due to corrosion, decarburization and poor heat treatment, all of which have resulted in the use of much controlled atmosphere equipment and close laboratory control in spring manufacture.

Alloy Steel Producers Credited For Development of Aircraft Steels

Reported by R. P. Nevers
Chemist, American Brass Co.

New Haven Chapter—With A. D. Eplett acting as technical chairman, A. J. Pepin, chief metallurgist of the Wyman-Gordon Co., addressed about 60 members at the January meeting in Bridgeport. The subject, "Production and Heat Treatment of Forging", was confined almost exclusively to steel parts produced for aircraft engines. The talk has been reported several times in previous issues of THE REVIEW.

Mr. Pepin pointed out, however, that great credit is due to the producers of alloy steels for their development of high strength materials. Their research "Production and Heat Treatment of Forgings", was cluding numbers of electric furnaces, have been important contributing factors. Alloy steel S.A.E. 4340, whose composition was stabilized in 1937 as X-4340, was described by the speaker as "the answer to an aircraft metallurgist's dream".

An excellent motion picture illustrated all major steps in the production of the forgings from acceptance tests and sinking of the dies through to final inspection.

Review of Current Metal Literature—*Cont.*

25. MISCELLANEOUS

(*Continued from page 15*)

25-44. Accuracy and the Geometry of Precision. E. Willard Pennington. *Tool & Die Journal*, v. 9, Feb. '44, pp. 102-103.
Precision workmanship, methods, and tools.

25-45. High Speed Marking and Filling. *Tool & Die Journal*, v. 9, Feb. '44, p. 109.
Illustrated description of the Acromark No. 9A and 9H marking machines.

26. STATISTICS

26-11. The Aluminum Industry. Philip D. Wilson. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 71-73.
Consumptive demand for war program not so great as forecast, so brakes are being put on production.

26-12. The Zinc Industry. Arthur A. Center. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 68-69.
Plenty of zinc for approved uses now available—new plant.

26-13. The Lead Industry. Wm. E. Milligan. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 66-67.
Production adequate throughout the year despite war handicaps—importance of scrap emphasized.

26-14. Magnesium. Philip D. Wilson. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 74-75.
Production has met all demands but possible new uses may require still further expansion.

26-15. Rare and Precious Metals. E. M. Wise. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 78-79.
Many are finding increasing uses, particularly in the electrical and electronics fields.

26-16. Non-Metallic Minerals. Oliver Bowles. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 82-88.
Large variety of raw materials and products found of value in war production—domestic deposits developed to replace imports.

26-17. Iron and Steel Process Metallurgy. W. O. Philbrook. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 89-92.
Record output attained despite scrap headaches—steel cartridge cases among the new products.

26-18. Non-Ferrous Physical Metallurgy. L. W. Kempf. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 104-106.
Brief reports on what the year has brought forth in aluminum, copper, lead, magnesium, nickel, silver, tin and zinc.

26-19. Ferrous Physical Metallurgy. Morris Cohen and Stewart G. Fletcher. *Mining & Metallurgy*, v. 25, no. 446, Feb. '44, pp. 93-95.
Closer co-ordination seen between fundamental scientific research and practical problems.

26-20. Too Many War Plants? *The United States News*, Feb. 11, '44, p. 22.
Shutdown of some facilities as surpluses of basic materials pile up. Local pressure to keep industries going. Disputes for peacetime in the making.

26-21. Minerals Flowing. *Business Week*, no. 753, Feb. 5, '44.
Axis powers monopolized Brazil's mineral riches until the war. Now the Allies are getting them and pushing development.

26-22. Annual Yearbook and Directory. *Aviation*, v. 43, Feb. '44.
Aircraft specifications, aircraft engine specifications; directory of aircraft, rotary wing, engine, glider manufacturers, and aviation suppliers, classified.

27. BIBLIOGRAPHY

27-8. The Welding Encyclopedia. Completely Revised and Re-Edited by T. B. Jefferson. Eleventh Edition, 1943. The Welding Engineer Publishing Co., 506 S. Wabash Ave., Chicago, Ill.

27-9. Precision Measurement in the Metal Working Industry. Prepared by Department of Education of International Business Machines Corp. 263 pp., illus. *Syracuse University Press*, Syracuse, N. Y.; $2.75.

27-10. Plastics Catalog: The 1944 Encyclopedia of Plastics. 990 pp., illus. Plastics Catalogue Publishing Co., New York City; $6.00.

27-11. Handbook on Designing for Quantity Production. Prepared and edited by Herbert Chase. 517 pp., illus. McGraw-Hill Book Co., Inc., New York, N. Y.; $5.00.

27-12. Ferrous Metallurgy: Volume II. The Manufacture and Fabrication of Steel. 2nd Ed. Ernest J. Teichert. 487 pp., illus. McGraw-Hill Book Co., Inc., New York, N. Y.; $4.00.

27-13. Ferrous Metallurgy: Volume I. Introduction to Ferrous Metallurgy. 2nd Ed. Ernest J. Teichert. 484 pp., illus. McGraw-Hill Book Co., Inc., New York, N. Y.; $4.00.

27-14. The Practical Design of Welded Steel Structures. H. Malcolm Priest. 150 pp., illus. American Welding Society, 33 W. 39th St., New York 18, N. Y.; $1.00.

Garrison Commissioned Navy Lieutenant

R. M. Garrison, past chairman of the Texas Chapter A.S.M., and formerly chief engineer of the Mission Mfg. Co. of Houston, has been commissioned a lieutenant (jg) in the U.S. Navy, and is assigned to the Office of Inspector of Naval Material, Cincinnati, Ohio.

Lieutenant Garrison resigned his position with Mission in April 1943 to become a civilian engineer with the St. Louis Ordnance District of the Army Ordnance Department, where he remained until his Naval commission came through at the first of the

In a western Pennsylvania steel mill, recently converted to shell manufacture, one 105-mm. shell, one of the biggest used by the United States Army, rolls off the line every 12 sec.

Hunt Receives Research Medal

A.S.M. National President Marc Grossmann Shakes Hands With Roy Arthur Hunt, President of Aluminum Co. of America, After Conferring Upon Him the A.S.M. Medal for the Advancement of Research. The citation and formal award of this medal were made at the A.S.M. convention in Chicago last October; the medal itself, however, was not presented to Mr. Hunt until Feb. 10 in Pittsburgh, at which time this photograph was made. National Secretary Eisenman and Past-Presidents E. C. Bain and W. H. Phillips were present at the award.

Distinguished Guests Make Gala Officers' Night

Reported by R. C. Heaslett
General Metallurgist, Continental Roll & Steel Foundry Co.

Pittsburgh Chapter—"A gala occasion" indeed was National Officers' Meeting on Feb. 10, for in addition to National President Grossmann and Secretary Eisenman, other distinguished guests included two past national presidents, Ed Bain and Bill Phillips, and National Trustee Norman Tisdale.

The completion of a second period of ten years' service as secretary of the Pittsburgh Chapter by H. L. Walker was the signal for a celebration, and Bill Eisenman, after presenting Hiram with a birthday cake, stood by while the venerable secretary cut and passed it. Secretary Eisenman also presented Secretary Walker with a 20-year certificate in recognition of his splendid efforts in behalf of the American Society for Metals.

Chairman Bates, at his best, then introduced National President Grossmann, who presented retiring Trustee Norm Tisdale with the Trustees' Medal, signifying distinguished service to the organization.

Bill Eisenman, in his own individual style, reported on the state of the Society, outlining past accomplishments and calling attention to the magnificent part the membership is playing in the war effort. He also reported on the trials and tribulations of running a farm and illustrated his points by appropriate word pictures.

Dr. Marcus A. Grossmann, as guest speaker of the evening, first reviewed the work done on hardenability in the past, and then, with masterful ability, presented this somewhat complex metallurgical subject in a simple and understandable manner.

Dr. Bain, as technical chairman, likewise nationally known for his work on the same subject, added noteworthy comments and led the audience in a stimulating discussion.

Gill's Tool Steel Lecture Enticing Invitation to New Book

Reported by Charles Nagler
University of Minnesota

North West Chapter—Those present at the January meeting were indeed fortunate in having James P. Gill, vice-president of Vanadium-Alloys Steel Corp. and past president of the A.S.M., as the speaker. Before the meeting a dinner was given for Mr. Gill at the "Covered Wagon", which is famous for its steaks. The meeting was held in the Coffman Memorial Union on the campus of the University of Minnesota.

Mr. Gill based his lecture largely on material contained in his newly revised and enlarged book entitled "Tool Steels". The wealth of valuable information given in the lecture constituted an enticing invitation to read the book, just published by the A.S.M.

Following a general discussion on tool steels, the members and guests present gave Mr. Gill a rising vote of thanks for his fine presentation.

Materials Index

To the Metal Literature Survey

THE FOLLOWING tabulation classifies the articles annotated in the preceding pages according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face. For instance, under "General Ferrous" 1-22-27 refers to articles No. 22 and 27 in Section 1 on Production of Metals; 3-31-33-35 refers to articles No. 31, 33 and 35 under Section 3 on Properties of Alloys, etc.

General Ferrous

1-22-27; **3**-31-33-35; **4**-4-5; **12**-37; **13**-4; **16**-21-23-25; **17**-9-10; **21**-22; **22**-64; **23**-30; **26**-17-19.

Cast Iron

2-10; **12**-46; **14**-42-46-58-59-61; **16**-20; **18**-35; **22**-65.

Cast Steel

2-10; **14**-45-48-50-54; **18**-30.

Wrought Carbon Steel

1-25; **3**-34; **11**-14; **12**-44; **18**-37-39; **19**-36-39-40-45-49-50; **20**-63; **22**-63-80-97; **23**-29.

Alloy Steel

3-31; **18**-40-43; **19**-44; **22**-89-94; **23**-56.

Stainless and Heat Resisting Steel

12-32; **14**-43.

Tool Steels and Carbides

12-47; **18**-33; **19**-33; **20**-42-43-46-47-51-56; **23**-43-48-52; **25**-24.

Ferro-Alloys

1-17.

General Non-Ferrous

3-33; **10**-7; **14**-55; **15**-4.

Aluminum

1-21-28; **3**-32; **7**-13-14; **8**-20; **10**-8; **12**-44; **14**-53-57-65; **15**-5; **19**-42-44; **21**-19; **22**-63-73-83-85-88; **23**-44-46; **26**-11.

Magnesium

1-19-23-26; **5**-4; **7**-18; **14**-56-67; **18**-25; **22**-66-68-83; **23**-44-46; **26**-14.

Copper, Brass and Bronze

1-18-24; **2**-12; **3**-27-30; **6**-5; **10**-7; **14**-71; **15**-6; **18**-42.

Nickel, Monel and Nickel Alloys

12-32; **22**-65; **23**-49.

Lead and Lead Alloys

26-13.

Tin and Tin Alloys

8-12-13-15-17; **23**-51.

Zinc and Zinc Alloys

3-28-29; **7**-20; **8**-12-13; **14**-60; **26**-12.

Miscellaneous and Minor Metals

2-11; **3**-28-29; **7**-20-21-22; **22**-71.

Cleveland Chapter Has Silver Anniversary

(*Continued from page 1*)

played an important part in the development of high speed steels, presented the history of the Cleveland Chapter, one of the earliest of the many that now compose the major society. Emmons was the first secretary and second chairman of the Cleveland Chapter in 1919 and 1920.

Dr. Grossmann addressed the technical meeting on "Hardenability of Steels and Effects of Alloys."

The following editorial concerning the meeting appeared in the Feb. 7th issue of the Cleveland *Press:*

The 25th anniversary of the Cleveland Chapter of the American Society for Metals, which will be observed tonight, is an appropriate time to call attention to the great progress which has taken place in the field of metallurgy.

Cleveland was the birthplace of the organization, which now has chapters in 62 other cities and membership of more than 18,000. The Cleveland chapter has 932 members and it is interesting to note that 23 of the 29 men who signed the application for a chapter a quarter of a century ago, plan to attend the silver anniversary meeting.

Metallurgy is the most ancient of the arts. It is axiomatic that the degree of civilization attained by a race is in proportion to the extent to which they made use of metallurgical processes. America and her allies are winning the war today because of our metal resources and our knowledge of how to use them. Organizations like the American Society for Metals have fostered and encouraged the development of new processes and new alloys and preparing them for wartime use.

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